THE INDIVIDUAL DEMAND FOR PRIVATE HEALTH INSURANCE IN MALAYSIA

ARPAH ABU BAKAR

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By

ARPAH ABU BAKAR

Thesis Submitted to Othman Yeop Abdullah
Graduate School of Business, Universiti Utara Malaysia
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Abstract

The main purpose of this study is to determine the factors that affect the individual decision to purchase health insurance and the level of coverage purchased. In addition, this study attempts to profile the policyholders and compare this against the profile of non policyholders, and also estimates the price elasticity of health insurance demand. A model to predict the likelihood of purchasing health insurance is also proposed. The thesis was developed based mainly on the Utility Theory, Prospect Theory and Bounded Rationality Theory. The dataset was obtained from the National Health and Morbidity Survey III. The two major analytical tools employed were logistic regression and the Heckman two-stage estimator. Due to the multicollinearity problem, the dataset were split into salaried and non-salaried individuals and were analyzed separately. The results revealed that the likelihood of health insurance purchase among the salaried individuals was higher if the individual's income and education were higher, and if the individual was a female, was a non-Muslim, was a civil servant, as well as if the individual was more risk averse, while the effect of age was nonlinear. The results also showed that those who were older, earned higher income, female, non-Muslims, had high out-of-pocket costs for health care tended to seek a higher amount of coverage. Individuals were less likely to purchase health insurance when the price increased and the price elasticity was relatively low indicating that a high subsidy would be needed to induce purchase. Given individual characteristics, the models were found to be useful in predicting individual's likelihood in purchasing health insurance for both the salaried and non salaried individuals. The findings offer useful inputs for insurance industry players and policy makers on various issues, including health care financing in Malaysia.

Keywords: Demand, Health Insurance, Utility Theory, Prospect Theory

Abstrak

Tujuan utama kajian ini adalah untuk menentukan faktor yang mempengaruhi keputusan individu membeli insurans kesihatan dan tahap perlindungan yang dibeli. Di samping itu, kajian ini menganalisis profil pemegang polisi insurans kesihatan dan menganggar keanjalan harga permintaan insurans kesihatan. Model untuk meramal kebarangkalian pembelian insurans kesihatan juga dicadangkan. Tesis ini dirangka berdasarkan Teori Utiliti, Teori Prospek dan Teori Rasionaliti Terbatas. Data diperolehi daripada Tinjauan Kebangsaan Kesihatan dan Morbiditi III. Analisis menggunakan dua kaedah utama iaitu Regresi Logistik dan Penganggar Dua-Tahap Heckman. Data dibahagikan kepada individu yang bergaji dan individu yang tidak bergaji. Hasil kajian menunjukkan kebarangkalian membeli insurans kesihatan adalah lebih tinggi di kalangan individu berpendapatan tinggi dan tahap pengajian tinggi, wanita, bukan Islam, pekerja kerajaan, dan individu yang lebih bersikap pengelak risiko manakala kesan umur adalah tidak linear. Kajian juga menunjukkan individu berpendapatan tinggi, lebih tua, wanita, bukan Islam dan mempunyai kos perubatan sendiri yang tinggi membeli insurans kesihatan dengan tahap perlindungan yang lebih tinggi. Di samping itu, kebarangkalian membeli insurans kesihatan akan meningkat jika harga polisi insurans dikurangkan namun keanjalan harga sangat rendah. Ini bermaksud, subsidi yang sangat tinggi mungkin diperlukan untuk menggalakkan pembelian insurans kesihatan. Dengan adanya maklumat individu, model-model kajian ini didapati berguna untuk meramal kebarangkalian individu membeli insurans kesihatan untuk kedua-dua kumpulan individu bergaji dan tidak bergaji. Dapatan kajian ini menawarkan input berguna kepada pihak industri insurans dan pembuat dasar berhubung beberapa isu termasuk pembiayaan penjagaan kesihatan di Malaysia.

Katakunci: Permintaan, Insurans Kesihatan, Teori Utiliti, Teori Prospek

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Private health insurance is one of the sources of funds for financing health care apart from direct taxes, public insurance and out of pocket payments. In some countries such as the United States, private health insurance is the source of funds for medical care for many individuals while in countries like the United Kingdom, the people are highly dependence on the public health insurance. The public health insurance could be in several forms such as mandated social insurance scheme as in the case of Japan or a tax-funded health financing scheme as in the case of United Kingdom.

In Malaysia, there is no specific program for public health insurance. Nevertheless, health care is highly accessible at the public health institutions for a minimal fee. Despite the fact, based on the Central Bank of Malaysia annual reports from year 2005 to 2008, the private health insurance business has grown significantly (Bank Negara Malaysia, 2005, 2009b). The report from the National Health and Morbidity Survey III which is a cross-sectional survey undertaken in year 2006, indicates that about 18.8% of the Malaysian population owned some type of private health insurance (Institute for Public Health, 2008).

Both the public and private funding supports the health care financing in Malaysia in a mixed public-private health care system. However, since the medical expenses at the public health institution are almost free, the public fund has to support majority of the population. Not to mention the migration of public health professionals to the private sectors due to lucrative salary offers. These factors pose threat to the sustainability of the current system. As such, the government is looking into a new financing scheme to ensure equitable health care for all. The idea of a new health financing scheme was first proposed during the Fourth Malaysia Plan (Economic Planning Unit, 1981) and was brought up again in the Eight Malaysia Plan (Economic Planning Unit, 2001). The proposal was to establish a national health financing scheme that integrate the financing and the delivery of care. Since the proposal, the government remains silence on the establishment of the national health financing scheme. However, recently the Health Minister, Datuk Seri Liow Tiong Lai announced that the government is seriously looking into the proposed ("Healthcare for Free," 2010). The new scheme requires contribution from the employers and the public to maintain the national health fund. Liow said that current trend shows many patients are now utilizing the private sector which may indicates their willingness to pay for health care.

As the new scheme will require contribution from the community, much can be learned from the current financing mechanism – the private health insurance. Better understanding of the current financing mechanism may shed some lights to the policymakers in ensuring the viability of the

new scheme. More importantly, further analysis on the demand for private health insurance will provide strategic knowledge to the insurance industry as the existence of a public health insurance program will mean a highly competitive market for the health insurance products.

Although there are abundance of researches in health care financing, the different health care system and health insurance practices have made findings in one country less comparable, much less to another country. In the Malaysian context, there has been no attempt to explore the demand for the private health insurance. As one of the source of health care financing, a research in health insurance demand is urgently needed.

Furthermore, the existing studies in health insurance demand provide contradicting evidence on the individual decision making towards health insurance purchase although scholars have proposed several theories. The dominant theory in consumer decision making is the Expected Utility Maximixation (EU) theory. The theory, developed by John von Neumann and Oskar Morgenstein in 1944, is the most widely used theory in behavioral economics and has been extensively used for decades to model decision making behavior under risk, including health insurance decision making (Friedman & Savage, 1948).

However, there was evidence that the EU Theory did not hold for many real world situation. Several researchers have already drawn attention

to the paradox in consumer behaviors leading to the generation of new theories to explain the behavior that cannot be explained by the EU theory. One in particular is the Prospect theory developed by Kahneman & Tversky in 1979. Despite the evidence that Prospect theory overcomes the drawbacks in the EU theory, empirical evidence on health insurance decision making supporting Prospect theory is still lacking.

As such, this research is conducted to better understand the consumer decision making in the field of health insurance, particularly in Malaysia. The findings from this research will inform the policy makers in the establishment of the national health financing scheme and also to the industry players in targeting potential new customers for their health insurance products.

1.2 Background of the Study

There are various types of insurance contracts that provide protection to individuals and businesses. The insurance contracts can be broadly grouped into general insurance and life insurance. General insurance covers products such as fire insurance and motor insurance where as life insurance companies offer life and health insurance policies. Specific types of health insurance is presented in the next section together with further discussion on health insurance relating to health care financings issues in Malaysia and selected countries.

1.2.1 Health Insurance

Health insurance policy is a contract that provides compensation or reimbursement for financial losses caused by bodily injury, sickness and accidental death. In exchange for a premium paid to an insurance company, an individual or a family is promised a compensation for financial losses incurred. The losses can be the loss of income because of inability to work, medical expenses and specific losses such as death and the loss of limb. Nyman (2006) defined health insurance contract as a contract that transfers "income or wealth from those who buy insurance and remain healthy, to those who buy insurance and become ill" (p. 720). Beside the out of pocket payment by the individual or family, health insurance has become one of the major sources for financing health care cost.

There are four major types of health insurance policy which are medical expense insurance, disability insurance, critical illnesses insurance and long-term care insurance. The medical expense insurance is designed to either pay income or benefits upon sickness or reimburse the medical expenses incurred because of sickness or accident. There are two main types of medical expense policy which are hospital and surgical insurance (HSI) policy and hospital income policy. HSI is a type of medical expenses insurance that covers medical expenses during hospitalization and the cost of surgical procedures. Other common benefits offered in HSI policy are anaesthetic fee, ambulance fee and physician fee during hospitalization. Most HSI contracts in Malaysia are at type of basic medical coverage in which maximum limit is rather low and full coverage is offered without a

deductible. Contrast to reimbursement basis, a hospital income policy pays fixed income based on the number of days of hospitalization regardless of the medical expenditures incurred. Usually, the insurance contract requires a minimum numbers of hospitalization days for the insured to be eligible to receive the hospital income benefits.

Disability insurance also provides income benefits when the insured is unable to work because of sickness or injury. In contrast with the hospital income policy, the income benefit in the disability insurance is usually based on a percentage of the insured salary and usually is limited up to a certain period of time.

Besides income benefits, there are policies that pay the total amount of sum assured or a specific percentage of the sum assured upon diagnosis of certain illnesses. This type of coverage is called critical illnesses (CI) policy. CI policy provides lump sum benefits payment upon diagnosis of certain insured illnesses such as cancer and stroke.

The long-term care insurance covers medical care or custodial care to an individual who need constant care due to inability to perform daily life activities such as feeding, dressing and toileting. The benefit paid can either be in terms of monthly income benefit or the cost of a nursing home.

1.2.2 Health Insurance Industry in Malaysia

In Malaysia, all health insurance are sold by the private market. The health insurance policies are sold by the general and life insurance companies. As of the year 2010, there were 39 direct insurers in Malaysia. Twenty four (24) of them are licensed as general insurers while 9 are life insurers, 6 are composite insurers (Bank Negara Malaysia, 2010b). Besides these conventional insurers, there are 9 takaful operators who offer shariah-based insurance products (Bank Negara Malaysia, 2010a).

Despite the availability of public health care, health insurance business has grown significantly. In 2010, the new business contribution for medical and health takaful was recorded at RM236.5 million compared to only RM187.6 million in year 2009 (Bank Negara Malaysia, 2010a). For the conventional market, the gross direct premium for medical expenses and personal accident insurance policy has increased from RM1,523.2 billion in 2009 to RM1,697.3 billion in 2010, a record of 11% growth (Bank Negara Malaysia, 2010b). In term of size, it is the 3rd after motor and fire policies.

Health insurance policy in the Malaysian market is known as medical and health insurance (MHI) policy. The most popular MHI product in Malaysia is the hospital and surgical insurance (HSI). Table 1.1 below shows the market share of each type of MHI in Malaysia (Bank Negara Malaysia, 2005).

Table 1.1
Types of MHI and Market Share

Types of MHI	Percentage Market Share
Hospital and Surgical Insurance	63%
Critical Illnesses	28%
Hospital Income	6%
Long/term care	2%
Others	1%

The MHI in Malaysia is designed primarily to cover inpatient care as offered by HSI policy and hospital income policy which captured 69% of the total market share in MHI sales in Malaysia. In the United States (US), the health insurance includes coverage for primary and out-patient care. In contrast, HSI policy provides coverage for medical expenses incurred during hospitalization only. Most HSI policies cover pre-hospitalization visit up to a certain number of days and only cover out-patient care due to emergency cases. One interesting feature in the HSI policy is that the insured is given an incentive in terms of daily income benefit if the policyholder chooses to get treatment at public hospitals.

Deductible or cost-sharing mechanism is not a popular provision. Nevertheless, some products have internal limit on specific procedures beside the annual and lifetime limit. Adults aged 18 to 65 years old are eligible to purchase coverage while children must obtain coverage through their parents. Most health insurance policies are renewable to the age of 75. In the early days, MHI policies were sold as a rider to life insurance

policies. Starting in year 1997, MHI was allowed to be sold as stand-alone policies.

MHI customers in Malaysia can be classified into individuals who obtain coverage through their employers and individuals who purchase coverage directly from the market. A report on Household Expenditure Survey 1998/99 (Department of Statistics, 2000) indicated that out of a monthly expenditure of RM1631.06, RM30.84 is spent on medical care and health expenses. From this amount, an average of RM2.16 is spent on accident and health insurance. There is a huge difference between the urban and rural spending in which the amount spent on accident and health insurance for urban population is RM3.29 per month while the rural population spent only RM0.87. By gender, a household with a male head on average spent RM32 per month for medical care and health expenses while a female head of household spent RM26 per month. These finding may reflect that a female individual is lacking of financial means to access health care or perhaps the family members are more dependent on the male as the head of household. Only 7.2% of the medical care and health expenses accounts for accident and health insurance premium. This value amounted to less than 0.1% of the total household expenditures. In the 2004/05 report, the amount spent on health per household reduced to RM27.05 per month (Department of Statistics, 2006). However, expenditure on accident and health insurance was categorized under miscellaneous goods and services. The amount spent on accident and accident insurance was RM4.24 per month. Although it was only about 0.2% of the average monthly

expenditure, the amount spent on accident and health insurance as reported in the 2004/05 report increased twofold from the 1998/99 report.

The Central Bank of Malaysia on the other hand, estimated that about 15% of the Malaysian population has MHI (Bank Negara Malaysia, 2005). The growth in the sales of MHI products can be attributed to the introduction of personal income tax relief for the purchase of MHI policies in 1996 (current tax relief is allowed up to RM3,000) and the stand alone policies starting in year 1997. Although the individual MHI policies accounted for more than 80% of total MHI policies sold in 2005, the sales of the group policies has outpaced the individual policies (Bank Negara Malaysia, 2005).

Group health insurance differs from individual health insurance primarily in terms of underwriting. In group health insurance, underwriting is based on group experience. Individual evidence of insurability is not required. Thus, unhealthy individuals can still be covered because it is expected that the group consists of both the healthy and unhealthy members.

The group health insurance is mainly offered by employers as an integral part of an employee benefits program. Health benefits provided by employers as a part of employee benefits program is called employer-sponsored health insurance (ESI). ESI may be financed via group health insurance or full self-funding by the employer. For financing via group

health insurance, employers may require employees to bear part of the cost by partial contribution to the premium (contributory plan).

In the US, most ESI is financed via group health insurance. ESI has become the main source of health care financing for individuals in the US. On the contrary, most ESI in Malaysia is on full self-funding arrangement by the employer and only a small number of employers purchase MHI to cover in-patient care. A report from the Salary and Fringe Benefit Survey for Executives conducted by the Malaysian Employers Federation (MEF) has indicated that there were only 14% (32) companies that provided medical insurance to their employees (2005). MEF is an organization that represents private employers in Malaysia. As of December 2007, MEF has 4339 members representing 1,459,146 employees. For out-patient services, employers usually make a contractual agreement with the local medical providers/ clinics. Majority of the employers provide health care benefits for their executives and the benefit plan is non-contributory.

1.2.3 The Malaysian Health Care System and Health Care Financing

Currently, the health care system in Malaysia is a mixed public-private system. The public health care providers are the Ministry of Health (MOH) and other government agencies like the related ministries, armed forces and universities that provide teaching facilities while the private providers consist of general practitioners, inpatient care facilities and private employers. Apart from these two major sectors, other players include traditional healers and non government organizations (NGOs). Medical

care can be obtained for free or at a minimum cost at any of the public hospitals and clinics throughout the country as medical care at the public health institutions are highly subsidized by the government.

Despite the high accessibility to the public health care, the number of private health institutions in Malaysia has been on the rise in the last few years especially in the urban and higher income areas. Table 1.2 shows the growth in the public and private hospitals from the year 2003 until 2009.

Table 1.2
Number of public and private hospitals from 2003 to 2009

Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Public hospitals & Special Medical Institutions: Ministry of Health (MOH)	117	119	122	134 (35,739)	136 (37,149)	137 (38,004)	136 (38,057)
Public hospitals: Non-MOH	7	6	6	6 (2,886)	6 (2908)	7 (3,245)	8 (3,523)
Total number of private hospitals/ Maternity/ Nursing homes	219	218	222	233 (11,637)	229 (11,722)	246 (12,165)	245 (12,619)

Cells show the number of health institutions (and number of hospital beds in parentheses)
Source: Health Facts 2003-2009. Ministry of Health Malaysia (MOH)

The growth of private hospitals is mainly caused by the increasing demand for health care and the fact that an increasing segment of the population seems to prefer utilizing its services rather than the public facilities, despite the former's higher cost. Private health providers were preferable to the public perhaps due to shorter waiting time, flexible opening hours and higher quality of care as found in a study by Syed Aljunid (1996).

Table 1.3
Total Expenditure on Health as % of GDP for selected countries, estimates for 1998 to 2008

Countries	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007***	**2008****
USA	13	13.1	13.2	13.9	14.7	15.1	15.2	15.2	15.3	15.7	15.2
United Kingdom	6.8	7.1	7.2	7.5	7.6	7.7	8	8.2	8.4	8.4	8.7
Japan	7.2	7.4	7.6	7.9	8	8.1	8	8.2	7.9	8.0	8.3
Malaysia	3.2	3.3	3.3	3.5	3.5	4.7	4.5	4.2	4.3	4.4	4.3
Singapore	3.5	3.7	3.4	3.7	3.7	4.2	3.7	3.5	3.4	3.1	3.3
Viet Nam	5.1	5	5.4	5.7	5.2	5.3	5.7	6	6.6	7.1	7.2

Source: World Health Organization (WHO) Statistical Information System. Retrieved 15 December 2009
*World Health Statistics 2010
**World Health Statistics 2011

Table 1.4
Per Capita Total Expenditure on Health (PPP in $), estimates for 1998 to 2008

Countries	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007***	**2008****
USA	4112	4318	4570	4915	5305	5682	6014	6347	6714	7285	7164
United Kingdom	1569	1689	1846	2022	2164	2270	2506	2598	2784	2992	3222
Japan	1747	1829	1967	2080	2137	2224	2337	2474	2514	2696	2817
Malaysia	241	259	280	298	313	443	459	454	500	604	621
Singapore	776	864	874	936	957	1126	1094	1140	1228	1643	1833
Viet Nam	109	113	132	148	147	162	188	221	264	183	201

Source: World Health Organization (WHO) Statistical Information System. Retrieved 15 December 2009
*World Health Statistics 2010
**World Health Statistics 2011

As a percentage of GDP, Malaysia is estimated to spend only 4.3% for health expenditure in 2006 compared to other developed nation such as United States which spent 15.3% in the same year. A cross country comparison is shown in Table 1.3.

The per capita health spending is shown in Table 1.4. The per capita total expenditure on health for Malaysia in year 2008 was $621. All countries show modest increment in the per capital total expenditure on health over the years 1998-2008.

Despite the low spending on health care, Malaysia has managed to achieve a high level of health status which is measured by the decreasing mortality rate. Malaysia has been cited among the five best performing countries by WHO in reducing the under-five mortality by at least 80%, by regions, from year 1975-2005 (*World Health Report*, 2008).

The health care expenditure in Malaysia is financed almost equally by the public and the private sources. The public and the private sector's health spending in Malaysia are shown in Table 1.5. Prior to year 2003, the proportion of public sector's health spending exceeds the private sector. However, the trend changes from year 2004 onwards. In year 2004, the public and private sector's health spending are almost equal while in years 2005 and 2006, the private sector's health spending exceeds the public sector.

Table 1.5
*Total expenditure on health in Malaysia by sources of financing (Public vs Private), from 2000 to 2008**

Year	Sources of Financing	
	Public	Private
2000	52.7	47.3
2001	56.12	43.88
2002	55.75	44.25
2003	54.49	45.51
2004	49.61	50.39
2005	44.07	55.93
2006	44.56	55.44
2007	44.14	55.86
2008	46.16	53.84

**Data include training expenditure as defined by the MNHA Framework*
Source: MNHA Health Expenditure Report 2009

In Malaysia, the public financing is taken from general taxes. The public system is handled by the federal government and provides care to everyone leading to universal coverage. The services are mostly rendered through the public hospital and clinics throughout the country by medical providers who are the employees of the federal government. The public finance comprises health expenditure incurred by the Ministry of Health (MOH), Ministry of Higher Education (MOHE), other federal and state agencies, and social security funds (Malaysian National Health Account (MNHA) Unit, 2008). The social security funds in Malaysia are managed by the Employees Provident Fund (EPF) and Social Security Organization (SOCSO).

The private finance is derived from private insurance, private employers (all corporations other than insurance), non-profit organizations (NGOs) and out-of-pocket payment (Malaysian National Health Account (MNHA) Unit, 2008).

The composition of health care financing in Malaysia from various sources in 2008 is presented in Table 1.6. Although MOH is the major financier for the public sector, the private household out-of-pocket is the highest contributor to the total health expenditure in Malaysia.

Table 1.6
Total Expenditure on Health in Malaysia by Sources of Financing for 2008

Sources of Financing	RM Million	%
Ministry of Health	13,036.3	37.09
Private Household OOP Expenditures	10,803.0	30.73
All corporations (other than health insurance)	4,780.0	13.60
Private Insurance Enterprises (other than social insurance)	2968.2	8.44
Other Federal Agencies (including statutory bodies)	1583.7	4.51
Ministry of Higher Education	1,053.9	3.00
Private MCOs and other similar entities	333.6	0.95
Local Authorities	212.7	0.61
Social Security Organization (SOCSO)	142.5	0.41
Ministry of Defence (MOD)	109.1	0.31
Employee Provident Fund (EPF)	48.7	0.14
State Government	39.5	0.11
Non-profit organizations (NGOs) serving households	37.4	0.11
Rest of the World	0.5	0.00
Total	**24,788**	**100**

Source: MNHA Health Expenditure Report 2009

Nonetheless, the cost of financing health care is a concern to the government as the health care budget has a significant increasing trend with each coming year although there was a slight decrease in year 2005. The details are presented in the Table 1.7.

Table 1.7
Ministry of Health Annual Budget and Per Capita Allocation

Year	MOH Annual Budget	% to National Budget	Per Capita Allocation (RM)
2001	5,765,553,410	6.33	240.10
2002	6,299,073,770	6.27	256.83
2003	7,556,006,400	6.88	301.66
2004	8,997,011,200	8.00	351.71
2005	7,860,430,500	6.69	300.85
2006	8,660,200,000	6.33	327.00
2007	11,200,557,600	7.02	412.34
2008	12,901,865,000	7.29	465.29

Source: MOH Annual Reports

Among the efforts taken by the government to contain the escalating cost is the corporatization of government hospitals and health support services. In 1996, services covering laundry, hospital equipment and facilities maintenance, cleaning and clinical waste disposal were privatized. One public health institution, the National Heart Institute, was corporatized in 1992. The government itself has conducted several studies on the health care industry in Malaysia. Among them are the National Health Financing Study (1984/1985), National Health Plan Study (1990/1992), Proposal for Financing Private Health Services for Government Servants (1993), Corporatization of 14 General Hospital Study (1995/1996) and the Report on the Household Expenditure Survey 2004/2005.

The idea of a national health insurance scheme has been made public since the early 2000s. In the new health financing scheme, a mandatory contribution by all individuals has been proposed. The government will continue to provide funding for the poor, the elderly, the disabled and the civil servants. The contributions will be administered by the National Health

Care Financing Authority under the Health Ministry. This Authority will manage the fund collected and will not be privatized. Those who can afford may purchase additional private health insurance that would entitle them to extra benefits such as accommodation in a higher-class ward. Up-to-date, no decisive announcement has been made.

1.2.4 Health Care Financing Around the World

The health care financing system can be classified according to the sources of financing and the mechanism used to pay the medical services and providers. The sources of financing can either be public or private funding. The public funding may be derived from general taxation or payroll tax (social insurance). The private funding covers private health insurance, employers' funds and out-of-pocket (OOP) expenditure.

The health care financing mechanism in a particular country can be at one extreme fully funded by the government such as the UK system or at another extreme depending heavily on private funding such as the US system. Other countries such as Japan and Vietnam fund their health care through a social insurance program.

Table 1.8 pictures the proportion of public and private expenditures in the selected countries. Higher proportion of public expenditure is recorded in the UK and Japan while in Singapore, Vietnam and USA, the private expenditure on health care exceeds the public expenditure.

Table 1.8
Proportion (in %) of total expenditure on health by sources of financing for selected countries, from 2000 to 2008

Countries	**2000**		**2001**		**2002**		**2003**	
	Public	Private	Public	Private	Public	Private	Public	Private
USA	43.6	56.4	43.7	56.3	44.6	55.4	44.6	55.4
United Kingdom	80.6	19.4	80.9	19.1	83	17	83.4	16.6
Japan	81.1	18.9	81.3	18.7	81.7	18.3	81.5	18.5
Malaysia	**51.2**	**48.8**	**52.4**	**47.6**	**55.8**	**44.2**	**55.4**	**44.6**
Singapore	41.6	58.4	36.8	63.2	33.9	66.1	30.1	69.9
Viet Nam	34.3	65.7	30.1	69.9	31	69	30	70

Table 1.8 (Continued)

Countries	**2004**		**2005**		**2006**		**2007***		**2008****	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
USA	44.5	55.5	44.8	55.2	45.1	54.9	45.5	54.5	47.8	52.2
United Kingdom	85.6	14.4	86.3	13.7	87.1	12.9	81.7	18.3	82.6	17.4
Japan	81.5	18.5	81.7	18.3	82.7	17.3	81.3	18.7	80.5	18
Malaysia	**56.4**	**43.6**	**50**	**50**	**44.8**	**55.2**	**44.4**	**55.6**	**44.1**	**55.9**
Singapore	34	66	30	70	31.9	68.1	32.6	63.8	34.1	65.9
Viet Nam	31.4	68.6	26.9	73.1	25.7	74.3	39.3	60.7	38.5	61.5

Source: World Health Organization (WHO) Statistical Information System.
*World Health Statistics 2010
**World Health Statistics 2011

Table 1.9

Out-of-pocket expenditure (OOP) as a percentage of Private expenditure on health for selected countries, from 1998 to 2008

Countries	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007***	**2008****
USA	27.6	27.1	26.6	25.7	25	24.5	24.1	23.9	23.5	22.6	24.4
United										62.7	63.7
Kingdom	71.4	70	69.5	78.3	80.3	91	91.8	92.1	92.2		
Japan	80.2	79.7	79.3	79.1	82.1	82.8	83.5	82.4	82.4	80.8	80.6
Malaysia	74.8	75	75.4	73.5	73.6	72.4	75.1	75.7	73.3	73.2	73.2
Singapore	96.3	97	97	96.8	96.8	94.1	93.9	93.8	94	93.9	94.3
Viet Nam	93.6	91.2	91	89.3	86.5	86.1	86.1	86.1	89.5	90.2	90.2

Source: World Health Organization (WHO) Statistical Information System.

Table 1.10

Private prepaid plans (PPP) as a percentage of Private expenditure on health for selected countries, from 1998 to 2008

Countries	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007***	**2008****
USA	60.6	61.4	62.7	64.1	65.3	65.7	66.3	66.3	66.4	63.5	68.8
United Kingdom	17.4	16.8	16.7	8	8	9	8.2	7.9	7.8	6.9	6.7
Japan	12.4	12.4	12.5	12.3	12.9	13.1	13.3	14.3	14.3	13.7	13.8
Malaysia	12.3	12.2	11.9	14.1	14.2	16.4	15.3	14.6	14.8	14.4	14.4
Singapore	0	0	0	0	0	2.8	3.1	3.1	2.9	2.8	2.6
Viet Nam	3.4	3.7	4.1	2.2	2.3	3.2	2.8	2.5	2.5	2.7	2.7

Source: World Health Organization (WHO) Statistical Information System.

*World Health Statistics 2010

**World Health Statistics 2011

The high private expenditure is mainly due to the high OOP expenditures. The OOP expenses include the health care expenses paid by consumers to the medical providers and the medical cost not covered by health insurance. As indicated in Table 1.9, OOP expenditure is the biggest portion of the private expenditure for all countries except the US. The low OOP expenditure for the US can be explained by the prevalence of private prepaid health plans which also cover out-patient expenditures in the country as indicated in Table 1.10.

In Vietnam, the high OOP expenditure is due to the fact the medical fees are based on user charges. However, the Vietnam's health care system has gone through a reform whereby a social insurance program was gradually started in year 1992. In year 2003, a health care fund for the poor was introduced. The existence of the social insurance program has managed to reduce the out-of-pocket expenditure from 93.6% in year 1998 to 89.5% in year 2006 as some of the health care expenditures were reimbursed by the program (Ekman, Liem, Duc, & Axelson, 2008; Jowett, 2003; Spehri, Moshiri, Simpson, & Sarma, 2008).

Singapore is another country which records high OOP expenditure. Private health expenditure in Singapore is funded through a medical saving program called Medisave. In 1990, a government approved health insurance scheme called Medishield was introduced. Medishield is meant for funding catastrophic health expenditures and is optional. Premium to Medishield can be paid via Medisave fund. Nevertheless, the existence of high deductible

and low reimbursement from Medishield result in high out-of-pocket payment via current income or Medisave (Reisman, 2006).

In Japan, the private health insurance co-exists with the government program although the latter dominates. In other words, Japanese health care insurance system is a hybrid between insurance (either public or private) which requires individual's contribution and social assistance which is funded by tax revenue (Naito, 2009). Although the health care system provides universal coverage, individuals are still responsible for co-payment when medical care is utilized. The co-payment, which can be up to 30%, varies according to health insurance scheme, types of services (inpatient or outpatient visit) and whether the patient is the household head or a dependent (Kan & Suzuki, 2006). Those who can afford may purchase the private health insurance to supplement the benefits provided by the social insurance program.

Further analysis on the health care environment among selected countries is presented in Table 1.11. In general, Japan and Vietnam provides examples of countries with social insurance program, United Kingdom (UK) with an extensive public program while the United States which dependence on private health insurance coverage. Singapore provides a difference perspective as the health care is partly funded through individual medical saving account. The characteristics of health care system and financing of a particular country is very unique leading to difficulties in applying the empirical evidence found in earlier studies.

Table 1.11
Health Care Environment among Selected Countries

ITEMS	MALAYSIA	SINGAPORE	VIETNAM	JAPAN	UK	US
CATEGORY		**High OOP via MSA**	**Social Ins – Low Income**	**Social Ins – High Income**	**Public Funding via Tax-based system**	**Private Health Ins**
Health System	Mixed public and private health care	Mixed public and private	Although the private providers have grown, services at the public sectors dominate.		Mixed public and private system	Private health care dominates
Health Care Financing	Public funding via highly subsidized government hospitals/clinics. Private – Employer, private health ins, OOP	Private funding dominates via Medisave, Medishield & PMIS OOP Public funding via Medifund	2/3 Private Funding (majority is OOP) 1/3 Public Funding – fund from general revenue Fund is managed by government body - VSS	Government subsidy Insurance premium – employee & employer OOP in terms of co-payment	Public funding dominates - Government through District Health Authorities and General Practitioner fundholders	Private funding dominates. ESI is the major source of financing for health care. Public funding through Medicaid & Medicare
Health Care providers	Public health care providers dominates		Public provider dominates Most pharmaceuticals are purchased from private vendors	Non profit health care providers dominates	Mixed public and private. Services at the private providers are paid from the fund.	Private providers dominate.

Table 1.11 (Continued)

ITEMS	MALAYSIA	SINGAPORE	VIETNAM	JAPAN	UK	US
Payment for Medical Services	Fee for service. The civil servants can get free medical care at public hospitals/clinics	Diagnostic Related Group (DRG)	User charges (since 1989). For pre-paid service = fee-for-service	Fee-for-service, fee schedule is fixed		Managed care dominates where payment is via capitation DRG
Insurance Coverage	Private Health Ins. Voluntarily. Individual private health insurance in the market dominates	Govt approved – Medishield (introduced in 1990) & Incomeshield Private Health Ins - Private Medical Ins Scheme (PMIS)	Social insurance a) Compulsotry Health Ins (CHI) • Social Health Ins (SHI) for civil servants & employees of large companies. • Health care fund for the poor (HCFP) was introduced in 2003 for the poor • Fund for children under 6 b) Voluntarily Health Ins (VHI) for students, self-employed, employees of small companies and dependants of CHI members.	Social ins dominates -For employees: Employees Health Ins -For self-employed, agricultural workers, unemployed, etc: Public/ National Health Insurance -For retirees (>65) -For elderly (>75) Private health ins exists	NHS Reform 1991	Private Health Ins - Voluntarily. ESI is the main coverage. Social Ins -Medicaid for elderly -Medicare for low income

Table 1.11 (Continued)

ITEMS	MALAYSIA	SINGAPORE	VIETNAM	JAPAN	UK	US
ESI	Usually private health ins for H&S coverage - Fee-for-service plan with several alternatives of premium and annual limit. Direct contracting with local clinics for out-patient treatment	NTUC Income Managed Health Care System (MHS)	None		None	Fee-for-service vs Managed care
Insurance product	Mainly covers in-patient care only. Deductible and coinsurance are rare. Managed care is not popular.		2 policies only: 1: Inpatient & Outpatient care 2: Inpatient care only Enrolees get 80% reduction on total user charges	Private health insurance pays fixed amount for admission (per day), outpatient after admission (per day), or operation (depend on the class).		Usually cover both in-patient and out-patient care. Deductible and coinsurance are common. Managed care is popular.
Tax Treatment	Contribution to individual health insurance are tax deductible to the individual up to RM3,000.					Contribution to individual health insurance are not tax deductible to the individual. Tax Reform Act 1986 – For Self-employed a portion of premium payments is tax deductible.

1.3 Problem Statement

The growth of the Malaysian health care system has been progressing rapidly over the years. It is now considered as one of the best in the region by the World Health Organization (*World Health Report*, 2008). However, like any other country across the globe, the cost of health care in Malaysia is rising. To date, the Malaysian government has been subsidizing health care expenditure at public hospitals and clinics with fees being set at just RM1 for outpatient treatment and RM5 for specialist consultation for Malaysian. The government spending on health care has ballooned enormously since 1983 with a budget allocation of RM1.034 billion to RM8.66 billion in 2006 (Ministry of Health Malaysia, 2004). Despite the government spending, the out-out-pocket cost (OOP) health expenditure in year 2006 for ages 18 and above was RM3.76 billion (Institute for Public Health, 2008) and it is the highest source of health care financing in Malaysia (Malaysian National Health Account (MNHA) Unit, 2008).

The rising cost of health care can be attributed to a number of factors. Among them are technology advancement that has led to the purchase of more advanced and costly technology equipments, and the utilization of sophisticated techniques that are being demanded by the people because of increased knowledge and expertise. Other factors are inflation, the emergence of new diseases and the development of new drugs. All these factors are believed to have caused the cost for health care to skyrocket, and which in turn has put a greater burden for the government to continue funding it.

As a result, the government intends to reduce "its role in the provision of health services and increase its regulatory and enforcement functions" as stated in the 7th Malaysia Plan (Economic Planning Unit, 1996). The motive is to shift the burden of financing the health care to the public through privatization and corporatization of the public hospitals and medical services. In addition, the government has put forward the idea of introducing a new "health financing scheme to meet health care costs" (Economic Planning Unit, 1996). The idea was again emphasized in the 8th and the 9th Malaysia Plan. In the 8th Malaysia Plan (2001-2005), one of the strategies outlined for health is "developing and instituting a healthcare financing scheme" (p. 495). The proposed scheme would incorporate cost-sharing concept which was intended to "provide consumer with a wider choice in the purchase of health services from both the public and private sectors" (p. 434).

Although to-date, no new scheme has been implemented, the idea of a national health financing scheme has been discussed widely. Statements were published by the Malaysian Medical Associations and the Primary Care Doctors' Organization of Malaysia. In addition, Dr Chua Hong Teck, the director of Social Services Section of Economic Planning Unit (EPU) has proposed a National Health Insurance as one of the financing options for Malaysia in his keynote address (2009). He raised the concern about the rising private health expenditure compared to the public health expenditure since year 2005, especially the high out-of-pocket (OOP) expenditure as

reported by the MNHA. This indicates the increase in the health care financing burden for individuals.

Regardless of the choice between a social and private insurance, health insurance ownership has been linked with lower OOP (*World Health Report*, 2008). Thus, health insurance as a type of health care financing, no doubt, will be one of the financing mechanisms in the health care financing model. As such, understanding the individual decision making towards health insurance is imperative. Up to date, the NHMS III has reported some profiles of the health insurance owners. However, there has been no attempt to compare the profile of the insured and the uninsured and to further explore the significant difference between these two groups.

This study will also help answer other policy questions as well. For example, should the participation to the public program be made voluntary or mandatory? As such, factors that determine who will seek voluntary coverage are relevant to this policy issue. In fact, not only it matters who insures but more importantly at what level because with community rating, an economically and socially viable scheme relies on cross-subsidization of the sick by the healthy and the poor by the rich.

Besides, not much is known about who are the ones likely to buy health insurance. Thus, further understanding on the decision to insure may assist in increasing the market penetration of the current private health insurance coverage thus ensuring access to the needed care and reducing

out-of-pocket cost. Previous attempt to develop a predicting model is not possible due to the lack of a nationally representative data. The NHMS III data has made it possible to predict the likelihood of an individual buying health insurance, given the individual characteristics. The determining factors that affect the individual decision to insure can be used to model the health insurance demand thus, allowing us to predict the individual decision making in health insurance purchase.

The effect of price on the decision to purchase health insurance is more difficult to estimate in the individual insurance market as the data on the actual type of health insurance policies purchased and the price offered are usually not available. As there are many types of health insurance products in the market, the price estimation is less accurate. However, there is less product variations in the Malaysian market. Therefore, it allows for a more precise determination of price variable. In fact, the understanding on the effect of price on individuals health insurance purchase will assist in a better product design to suit the customers' needs as well as to meet the requirements of the insurance provider, be it the government or the private insurance companies.

Although there are numerous studies on health insurance demand, the differences between Malaysia and other countries as depicted in Table 1.11 make the results from other countries less applicable to the Malaysian setting. In fact, Schneider (2004) has suggested that the application of economic theories to other setting such as in low-income countries, should

be tested in the relevant real market situations. Thus, the unique characteristics of the Malaysian health care system warrant the undertaking of fresh independent research efforts. It is rather interesting to explore and better understand the demand for the private health insurance in the Malaysian setting as the public health care is currently highly accessible at a minimum cost.

Besides, the research in health insurance demand has not been given due attention in Malaysia. There were two studies in group health insurance in Malaysia. A case study on group health insurance was conducted by Arpah Abu Bakar, Habibah Tolos and Lakehal-Ayat (2002) The study was conducted to develop a case study for class purposes. The study was limited in scope since it covered only one institution and it was more on the perspective of the employer rather than decision to buy by the employees. Another study (Arpah Abu Bakar, Habibah Tolos, & Razli Che Razak, 2004) explored the demographic factors of the individuals who had health insurance. The findings from that study may have not been representative of the Malaysian case as it was based on data from selected states only.

In addition, most researches in health insurance decision making to date have tended to focus more on EU theory when modeling the health insurance demand (Besley, Hall, & Preston, 1999; Jofre-Bonet, 2000; Propper, 1989). Despite the criticism towards the EU theory and the new perspective proffered by Kahneman and Taversky in their Prospect theory researchers seem to have shunned Prospect theory. Both theories could be fully utilized to uncover the factors that affect the health insurance demand.

In a nutshell, the study is mainly motivated by the following problems:

1) The increase in health care cost which has led to higher annual budgets for the government, which is then forced to seek for new financing mechanisms to reduce its financing burden.

2) The increase in individuals' health care financing burden as evidenced by the high private health care spending, high out-of-pocket costs and corporatization of public hospitals.

3) Any proposed health financing scheme also raises policy questions such as who are to be targeted in the scheme, whether the participation is voluntary or mandatory and whether the private health coverage is to act as a supplement to the public coverage offered by the scheme.

This study augments the current researches in health insurance demand by analyzing the factors that affect the individual's health insurance purchasing decision covering both the probability of purchase and the level of coverage. Understanding the ways in which the various household characteristics relate to decision making in health insurance demand is important since it will provide insight on the issues of health care financing in Malaysia.

1.4 Research Questions

The findings of this study are expected to answer the following research questions:

1. What are the profiles of individuals who owned and do not owned health insurance?
2. What are the socio-economic and demographic factors that affect the decision to purchase health insurance?
3. Is the price of health insurance coverage significant in influencing health insurance demand?
4. What is the likelihood of a person buying health insurance, given the person's characteristics?
5. What are the socio-economic and demographic factors that affect the amount of health insurance coverage purchased?

1.5 Research Objectives

This research is conducted to meet the following objectives:

1. To compare the profile of individual with and without health insurance coverage;
2. To determine the factors that affect the individual demand for private health insurance;
3. To determine the price elasticity of health insurance demand;
4. To predict, with reasonable accuracy, the likelihood of a person buying health insurance, given the person's characteristics; and

5. To determine the factors that affect the level of private health insurance coverage purchased

1.6 The Importance of the Study

The findings of this study shall provide further insight about the factors that affect an individual's decision making under uncertainty, particularly in the field of health insurance. The current economic theories that focus on the topic of decision making under risk are the expected utility maximization (EU) and prospect theories. This research shall provide further empirical evidence regarding the theories in the field of health insurance.

In addition, this study seeks to distinguish the current decision making models in a different health care system. This study is conducted in a health care system in which the demand for private health care providers exists although the public health care providers are dominant. This health care environment is common in developing countries. The different health care system may result in a different model than that in developed countries and is more likely to be relevant for the Malaysian case. Other countries with a similar economic environment can also benefit from the study to a great extent.

In particular, the research findings can be useful for the marketing efforts of health insurance in Malaysia. The fierce competition in the health care industry has resulted in the need for strategic information on the factors that influence consumer decision making in health insurance purchase. The

model can be used by the insurance companies to predict the potential customers. Thus, customized marketing efforts can be made to the targeted segment of individuals. This strategy will reduce waste in terms of time and marketing resources.

Furthermore, the empirical evidence from this study is valuable to the policy makers, in particular the Malaysian government, in developing health care policies. It can be utilized to address issues related to financing mechanism as well as insurance design, such as the establishment of a National Health Insurance program. Better understanding on individuals who will insure or remain uninsured will aid in policy development to improve access to health care especially to the needy. It can also shed light on the necessary intervention such as tax credit or tax exemption to induce insurance ownership and eventually improve access to health care for all.

Finally, the findings from this study shall be more reliable as it combined both the health insurance ownership and health care utilization on one actual observation. In addition, the health insurance market with less product variation shall assist in more accurate estimation. Although it may not be a contribution, this fact provides significant strength to the study.

Taken as a whole, this research effort will broaden the existing body of knowledge in the field of insurance, and in particular, individual health insurance decision making under uncertainty.

1.7 Structure of Thesis

This chapter presents the background of this study. Starting with the current financial landscape relating to insurance in Malaysia, the discussion extends to the issue of health insurance as one of the individual health care financing option. The health care financing environments of selected countries were compared. The differences between Malaysia and the other countries in terms of its health care financing system make previous empirical findings less applicable to the Malaysian setting. The closest case is the UK health system as the Malaysian public health care is also tax-financed. However, the ratio of the public and private health care expenditure between Malaysia and the UK differs substantially signalling a major difference in behavior toward health care financing. The private health care expenditure in the UK in 2006 was only 12.6 percent of the total health expenditure as compared to Malaysia which was 54.8 percent.

The need for a new empirical study for Malaysia is discussed in the problem statements. Then the specific research questions and objectives are presented. It is very interesting to explore the effect of the income, various socio-demographic variables, the health status and the health insurance price on the health insurance demand in Malaysia. The Malaysian market will provide further evidence to the current literatures on insurance demand studies.

The thesis is organized as follows: Chapter 1 introduces the health insurance and health care industry in Malaysia and presents the problem

statement, objectives of the study as well as the importance of the study. Chapter 2 discusses the theoretical background and reviews the literature in the field. Chapter 3 explains the theoretical framework and the research methods employed in this study. The research findings are described in Chapter 4 and the recommendations are put forward in Chapter 5 together with the conclusions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The focus discussion in this chapter is the literature review. It starts with the theoretical background and then continues with the empirical evidence in the field of health insurance demand.

Four theories were reviewed. The two fundamental theories were the Expected Utility Theory and the Prospect Theory. The other theories that support the theoretical framework which were the Bounded Rationality Theory and the Theory of Reasoned Action were also discussed. These theories were central in the selection of the variables in the research methods chapter.

In the next section, previous researches in the field of health insurance demand were reviewed. As this research is focused on individual health insurance demand, the literatures selected mostly studied the demand for non group or individually purchased health insurance. In certain cases, evidence from the group health insurance was also presented as there was not enough supports from the individual health insurance studies.

The literature review chapter is divided into three sections. Section 2.2 discusses the relevant theories in health insurance demand. Section 2.3 discusses past empirical evidence and Section 2.4 concludes.

2.2 Theories Related to Decision Making

The theory underpinning the demand for insurance has received considerable scholarly attention and is equally applicable to the demand for health insurance. The relevant theories are the Expected Utility Maximization Theory, the Prospect Theory, the Bounded Rationality Theory and the Theory of Reasoned Action.

2.2.1 Expected Utility Maximization Theory

The utility theory is an economic theory that explains behavior of individuals based on the premise people can consistently rank order their choices depending upon their preferences. The preference or the decision is made by assigning imaginary utility values to the original monetary values as utility denotes levels of satisfaction. Thus, individuals behave as if they maximize the utility (monetary outcome), not the level of observed dollar amounts (monetary value) (Friedman, 1955). The concept can be traced back to as early as year 1738 by Daniel Bernoulli (cited in Friedman and Savage, 1948).

The concept of utility was applied in the theory of decision making under uncertainty by John von Neumann and Oskar Morgenstein**.** In 1944, Neumann and Morgenstein defined an expected utility function over lotteries or gambling, and stated that individual is rational in his or her decision and will behave in a way to maximize his or her utility when confronted with alternatives (Friedman & Savage, 1948). The expected utility of an outcome is the utility that is assigned to its occurrence, multiplied by the probability of its occurrence. The expected utility theory has been widely applied in the analysis of decision making under risk (where probabilities are known) and uncertainty (where probabilities are unknown). An individual is assumed to maximize the von Neumann-Morgenstein expected utility function as follows:

$$EU(x) = \sum_{i=1}^{n} p_i u_i(x_i)$$

where;

$EU(x_i)$ = expected utility

p_i = probability

$u_i(x_i)$ = utility of outcome or level of satisfaction associated with outcome

The expected utility function representation is not unique. In the context of health insurance purchasing, following Friedman (1974), the expected utility function can be expressed as follows:

$$Z_i = \int U(h, X_{ih}, W - P_i - C_{ih}) f(h) dh$$

where,

h = various state of illness
X = medical expenses
W= initial wealth
P = premium
C = direct expenses not reimbursed by insurer
$f(h)$ = probability of state of illness

The EU theory provides important predictors for modeling individual health insurance demand. The individual utility depends on how the premium of the health insurance product, the medical expenses and the probability of contracting an illness affect the initial wealth. The individual is expected to purchase health insurance if the decision increases his or her state of utility.

The state of one's utility varies depending on the changes of the initial wealth. The initial wealth can be proxy by income. The higher the individual income, the impact of price is less to one's initial wealth. Other things being equal, an individual who has to pay a higher premium would be less likely to buy health insurance as the health insurance product may be valued as expensive thus results in lower utility to that particular individual. Expenses related to medical care can also reduce initial wealth. The

uncertainty in the potential loss due to medical expenditure can reduce one's utility. Thus, the health insurance coverage is desirable because it can help to smooth out the effect of adverse medical events on one's wealth as health insurance pays for incurred medical expenditures in exchange for small periodic premium payments.

Likewise, those with a higher probability of contracting illnesses have higher probability of needing medical care and thus are more likely to buy health insurance. The needs for health insurance coverage rises for those who predict deteriorating future health states because having health insurance coverage ensure better access to the required medical care as the financing is confirmed. The probability of needing medical care can be proxy using the number of visit to the out-patient and in-patient care.

The probability of incurring medical expenditures reflects the uncertainty or the risky outcomes faced by individual in their decision whether to insure or not. An older individual is usually associated with health deterioration which in turn may lead to higher probability of incurring medical expenses as well as higher amount of medical expenditures. Thus, the decision to buy health insurance coverage for the older individual may result in higher expected utility than younger individuals. The decision to choose insurance over no insurance reflects individual preference towards certainty.

The preference towards certainty lead to the assumption that individuals are risk averse and they purchase health insurance in order to avoid uncertainty due the adverse effect from possible high medical expenditure which in turn affects net wealth. The decision to purchase health insurance is associated with a welfare gain resulting from efficiency derived from certainty. The level of risk aversion differs between individuals. Female individuals are said to have higher risk aversion than male individuals as they have higher likelihood of being insured (Auerbach & Ohri, 2006; Marquis & Long, 1995).

Similarly, an individual with a larger number of members in a household perhaps is more risk averse as the family members are exposed to greater chances of incurring medical cost and higher medical expenditure. The well being of the family members may affect the individuals financially and emotionally which then reflect the level of risk aversion of the individual. Thus, an individual with a larger household may be more likely to be insured to ensure accessibility to the needed medical care and adequate coverage. However, the effect of household size can also be the opposite as the bigger the household size the insurance policy may be less affordable to the individual as he or she needs to support for more fundamental needs such as food and shelter for the family. As such, buying health insurance will result in lower utility to the person.

A very constructive view on the development of the theoretical foundations with regard to the application of utility theory in health insurance was reviewed by John A. Nyman. Nyman (2006) traced the development from the seminal paper by Friedman and Savage (1948) to Pauly (published in 1968), de Meza (published in 1983) and his own which was published in 2003. As discussed at the beginning of this section, the history of the analysis of demand for insurance started from Daniel Bernoulli's 1738 seminal paper which first introduced the concept of utility. However, the modern analysis of the demand for insurance is linked to Friedman and Savage (1948) who claimed that utility is assumed to be increasing with income or wealth at a decreasing rate. As such, an individual who faced possibilities of losing a pre-specified amount of income (due to ill health and incur medical expenses) will decide to purchase insurance because the expected utility is greater with insurance than without it.

As criticized by Nyman (2006), this contention ignores the fact that medical care spending not only affects net income but also health and lives. Investing in health will lead to reduction of lost sick time thus increases utility directly (Grossman, 1972). Buying health insurance may be considered as investing in health as it provides access to the needed medical care and more likely at the needed time. Further, if health is valued as an investment goods, the reduction in sick time has a positive impact on income and wealth as it increases earning opportunities.

The analysis on the health insurance demand then included the utility derived from receiving medical care. In his influential paper, Pauly extended the Friedman and Savage (1948) model to include utility derived from health care. However, this utility value still resulted in welfare loss since its value was less than the cost of producing health care. In other words, the insurance payoff reduces the price of medical care. In the case of full reimbursement, the medical care price becomes zero while the true price is still the marginal cost of producing the medical care. This situation leads to moral hazard problem whereby an individual is indifferent on spending additional health care since the price paid during consumption is zero. The additional health care consumed by those who are insured is a welfare loss to the community.

Nyman (2006) commented on Pauly's model on the ground that demand for health insurance may differ between the ill and the healthy, and the medical expenditure consumed by the ill may not reflect the moral hazard problem but the redistribution of income (income transfer) from the healthy to the ill. In his analogy, Nyman (2006) argued that although the price of coronary bypass procedure becomes zero, a healthy individual would never consume the medical care. However, for the ill person, being insured may allow the individual to afford the procedure. In his proposition, Nyman (2004) differentiated between inefficient moral hazard (purchase of insurance due to reduction in price) and efficient moral hazard (purchase of insurance due to income transfer). The former is welfare decreasing and the

latter is welfare increasing. This contention substantially differs from the conventional theory of Friedman and Savage (1948).

Despite Nyman's argument, the theory that dominates health insurance demand studies central on Friedman and Savage (1948) which held that:

1) health insurance was demanded because consumer preferred certain losses to uncertain ones of the same expected magnitude; but that
2) the additional health care consumed because of health insurance made consumers worse off.

As moral hazard is not a focus in this study, our main concern is on consumer preference towards certain losses compared to uncertain losses. Application of the theory to the health insurance demand is that the uncertainty in the future expected medical cost makes the decision to be insured provides a higher state of utility to the individual rather than to be uninsured. Health insurance ownership provides reimbursement for the covered medical expenditures in an exchange of a premium. Being insured ensures that an individual pays a certain cost at the current state which is the premium rather than incurring the future medical expenditure which is uncertain in value. Similarly, the uncertainty in the future health state which leads to the risk in the future medical care cost to be incurred affects the net income which then affects the decision to be insured or not. The preference

towards certainty reflects individual's attitude towards risk. The EU theory assumes that individuals are risk averse and thus are more likely to insure.

Despite the explanation from EU theory that being insured result in higher utility state to individuals there are many people who decide to be uninsured meaning there are willing to accept the potential loss. The EU theory is unable to explain this situation. A further refinement to the individual's health insurance demand is explained by the Prospect theory.

2.2.2 Prospect Theory

A number of studies have attempted to model individuals' decision using other theories other than expected utility theory. The effort was made when laboratory experiments of choice under risk showed that the individuals act were inconsistent with the principle of the EU theory. A seminal contribution in this area is that of Kahneman and Tversky (1979) who developed Prospect theory.

Following Camerer (1992), prospect theory values outcome as follows:

$$V(x) = \sum_{i=1}^{n} \pi(p_i) v(x_i - r)$$

where;

$V(x_i)$ = value function for outcome x

$\pi(p_i)$= the function that weight probability nonlinearly

r = the reference point

Prospect theory differs from EU theory in several aspects. First, the decision outcomes are viewed as gains or losses relative to a reference point rather than their impact on the overall wealth as postulated by the EU theory. When choosing between gains, the individuals tend to exhibit risk averse behavior while risk seeking behavior is shown when confronted with alternatives that involve losses.

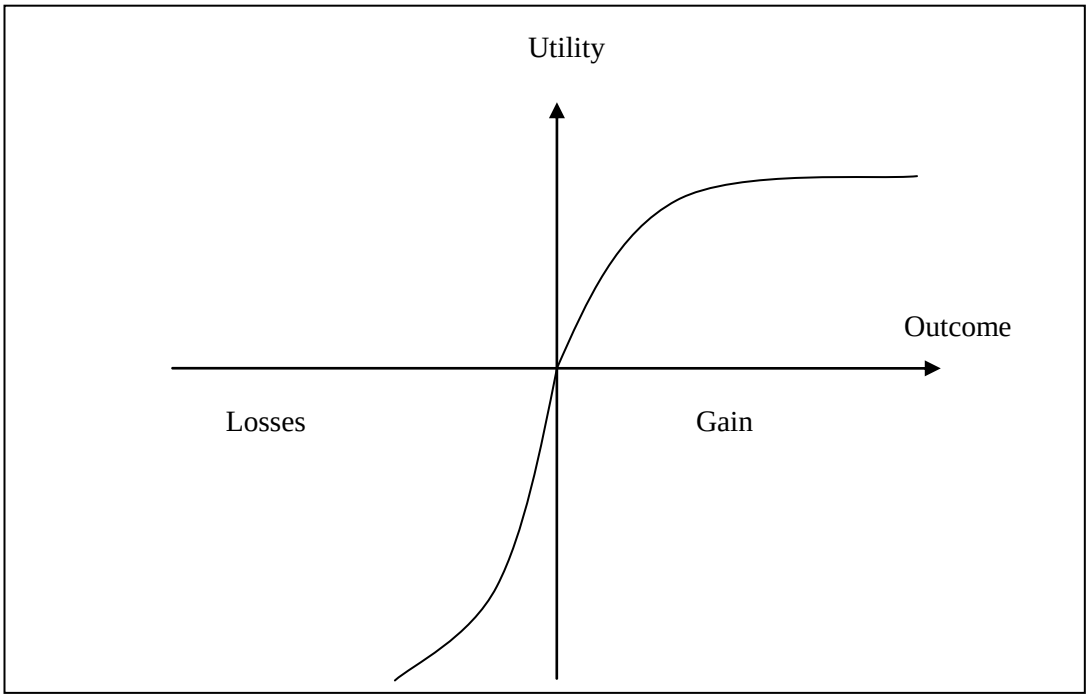
Second, Prospect theory uses "decision weights" as opposed to probabilities to explain the nonlinear weighting of probabilities. It postulates individual tends to overweight small probability occurrences and underweight moderate and high probability occurrences. In other words, decision weight is generally lower than the corresponding probability in the range of moderate to high probability occurrences and higher in the range of low probability. An individual also tends to put more weight to losses than gains as the disutility of a loss is greater than the utility of gain of the same amount.

Third, the riskless component of a prospect is evaluated separately from risky components. An individual under weighs outcome that is probable compares to an outcome that is certain. Thus, when choosing between probable gain and certain gain, an individual will choose certain gain even though the probable gain results in higher expected value. On the contrary, the individual will prefer probable loss compared to certain loss when confronted with loss alternatives even though the certain loss results in lower expected value. This prediction violates the EU theory which said

that an individual will choose an alternative that result in higher expected value (lower expected value for losses) since it results in higher utility.

Individual behavior as explained by prospect theory is shown in the following graph. The shape for loss is convex (implies risk seeking) while for gain is concave (implies risk aversion). In other words, an individual exhibits risk averse behavior when choosing between gains while in choosing between losses, individuals will exhibit risk seeking behavior. The value function is steeper for losses than for gain meaning that a person who has to make a decision that involves risk will react to losses more strongly (put more weight) than gains (Kahneman & Tversky, 1979).

Figure 2.1
Illustration of the shape of the utility function in Prospect Theory



For simplicity, consider a situation in which an individual has a 90 percent chance of staying healthy and a 10 percent chance of getting sick. The individual has the following alternatives:

1) Purchase health insurance policy and incur premium cost of RM1,000 (A sure loss of RM1,000)
2) Do not buy health insurance.

Let's assume that the cost of medical care is RM15,000 if the individual is sick and that RM1 equals to 1 utils. Based on the EU theory, the individual will choose option 1 because the outcome of option 2 is RM1,500 [0.1 x RM15,000] meaning that option 2 will reduce the current wealth more than option 1.

On the contrary, the prediction by prospect theory depends on the reference point as well as how the individual assigns weight to the probability. If the reference point is the current wealth, the alternatives are viewed in terms of losses as buying health insurance means incurring a cost. Thus, the individual becomes risk seeking and is more likely to choose option 2 since there is high chance the he or she remains healthy. If he or she stays healthy, choosing option 2 results in no cost at all since there is no health care expenses and no premium payment.

The decision made may also be affected by the weight assigned to the probabilities. An overweighting of low probability event may undo the effect of the convexity of the value function in losses thus resulting in risk

averse behavior. In this case, an individual may put more weight to the probability of getting sick thus will choose option 1.

The reference point and the decision weight suggested by the prospect theory explain certain anomaly that could not be explained by the EU theory. For example, an individual who buys lottery ticket and at the same time buys health insurance coverage. That particular individual displays risk seeking behavior when buying the lottery ticket but is risk averse when buying health insurance coverage.

The prospect theory contributes to this study by introducing the importance of the reference point in making decision whether to purchase health insurance or not. The reference point may be set by the income level, current health status, the utilization rate and the out-of-pocket (OOP) cost. If the current health status of an individual is good, he or she may decide not to purchase health insurance coverage as buying health insurance may be seen as a loss relative to the current state due to the payment of premium. The difference income levels means that the reference point is different among individuals. For high income individuals, the effect of price or medical expenditures may be less thus may view the option to buy health insurance in term of gains thus leading to a decision to purchase the health insurance coverage.

The utilization rate and the OOP health expenditure may affect the individual's assignment of probabilities towards potential losses. An

individual with higher frequency of visiting to hospitals and higher OOP may expect higher potential losses in the coming year and thus assigns more weight to the probability of losses due to medical calamities. Therefore, this individual will be more likely to seek for insurance coverage to ensure that medical related payments are secured.

The inter-changing behavior of individual from risk averse to risk seeking suggests that attitude towards risk is an important predictor. The individual's attitude towards risk reflects individual inclination in taking certain behaviors that involve risk. Thus, any risky alternatives such as smoking behavior may be used as a proxy for attitude towards risks.

Several studies provide evidence suggesting that the Prospect Theory can better explain individual decision to purchase health insurance as compared to the EU Theory (Ellis, 1989; Manning & Marquis, 1996; Marquis & Holmer, 1996). Marquis and Holmer (1996) compared the models on the decision to purchase additional health insurance based on the EU Theory and Prospect Theory. The researchers proved that the alternative utility model based on Prospect Theory was superior in predicting the insurance purchase decision compared to the one based on the EU Theory.

Similarly, Ellis (1989) found that in term of risky choices, consumers put more weight on uncertain outcome (OOP health expenditure) than to the certain outcome (premium). The finding is consistent with one of the hypothesis in the Prospect theory which states that riskless components

of a prospect are evaluated separately from risky components. In the study, the researchers modeled the insurance plan choice by using expected OOP cost. The data was taken from one company in 1982 and 1983. In the beginning of year 1982, employees were covered by one health plan only however the employees were forced to choose between three health plans that only differ in terms of financial features in the beginning of year 1983. The selection criterion was based on minimizing the sum of expected OOP health cost plus the premium.

Ellis (1986) used the empirically observed distributions of OOP expenses while Marquis and Holmer (1986) used the technique of asking individuals what their expected total health cost were and then simulated the distributions of OOP health expenditure. The reference point used in Marquis and Holmer (1986) was stochastic (a linear function of income) while Ellis chose zero as the constant reference state.

Despite the findings by Marquis and Holmer (1986) and Ellis (1989), Manning and Marquis (1996) demonstrated that although the fitted model using the Prospect Theory is better than the EU model, "the differences in modeling had only negligible impact on the choice of an optimal health insurance plan" (p. 627). Manning and Marquis (1996) estimated the demand for health insurance and health services as the functions of co-insurance rates, deductibles and upper limits on OOP. The researchers used the RAND Health Insurance Experiment (HIE) data and assumed that utility was defined as a function of health care and other

goods, rather than solely as a function of non-health consumption as in Marquis and Holmer (1996).

In this study, the intention is not to compare which theory best describe the demand for health insurance but to find factors that affect the demand for health insurance. As such, both theories are utilized in deriving the predictors. Similar effort was taken by Sturman, Boudreau and Corcoran (1996).

2.2.3 Bounded Rationality Theory

Another scholar who argued that people's actual performance deviates from the rational benchmark of the EU Theory is Herbert A. Simon. Simon (1955) introduced the concept of bounded rationality which postulates that an "economic man" is constrained by many factors in making decisions thus his behavior is a reflective of "the characteristics of the environment and the interrelations of environment and organism (man)" (Simon, 1955, p. 100). The constraints which Simon classified as "internal" and "external", may arise from the environment or the organism (man) itself leading to individual making a decision that satisfies, not maximizes, his utility.

One of the constraints suggested in his seminal paper is "physiological and psychological limitations of the organism" (Simon, 1955, p. 101). Hanoch and Rice (2006), in their study on the elderly and their health insurance choice, reported that the elderly is constrained with the cognitive ability and faced with decision conflicts when given too many

choices of health insurance options. In an information-rich and risky environment, individual may be reluctant or unable to collect or to process information they need in order to make decision (Hanoch & Rice, 2006; Kunreuther & Pauly, 2006).

Simon has also introduced a variable which he called "focus of attention" (1986). He drew attention to the circumstances that attract the decision maker which does not comply with utility-maximized individual. In his argument, Simon supported his contention with an empirical finding by Kunreuther et al (1978) who found that property owners purchased insurance coverage against flood coverage because they had adverse experience with flood or they knew someone who had such experiences. The adverse experience becomes the focus of attention in the decision process and not the cost/benefit ratio of the purchasers or the expected value of the outcome as predicted by the EU theory.

The constraints as proposed by Simon may be important predictors in health insurance buying decisions. The health care delivery characteristics such as the distance to the private hospitals give constraints in terms of accessibility. Likewise, more private hospitals are located in the urban than in the rural area. In the Malaysian context, the health insurance coverage is primarily for health care utilization at the private hospitals thus the need for health insurance coverage may be lesser when the accessibility to the private hospital is limited.

Other variables of interest are the types of occupation, job sector and the level of education which may reflect the influence from the different environment that the respondent may be involved in. The level of education may reflect the level of awareness on information related to health insurance. Those who have higher level of education may be more aware on the importance of health insurance or may have a better capacity to absorb health insurance related information thus have better understanding on the needs for health insurance. As such, they are more likely to purchase health insurance coverage. The types of occupation and the job sector may reflect the level of risk that the individual is exposed to thus may increase the needs to own health insurance coverage for those who are in riskier jobs.

2.2.4 Theory of Reasoned Action

The theoretical argument on the demand for health insurance perhaps can also be explored from the non-economic theory. A theory that warrants discussion is the Theory of Reasoned Action (TRA) developed by Martin Fishbein and Icek Ajzen (1972). The theory explains the link between attitude and behavior. TRA suggests that human actual behavior is guided by his or her behavioral belief and attitude towards behavior as well as the normative belief and subjective norms. TRA is used more to explain behavior than predicting it. In more recent development, Ajzen (2002) introduced additional variable which is "control belief and perceived behavioral control" to account for the fact that some individual lacks of

volitional control on intended actions. For this, he named it as Theory of Planned Behavior (TPB).

A variable of interest that can be derived from TRA/TPB is the influence of social norms, in this case it can be proxy by religion and race. The Malaysian population comprises of different religions and ethnicities. The majority of Muslim Malay population seems not to desire insurance coverage perhaps due to inconformity of conventional insurance towards Islamic principles. Browne and Kim (1993) in their international analysis of insurance demand reported than the demand for life insurance is less in predominantly Muslim countries. Although, there are now Takaful products (Islamic insurance contracts), the market penetration is still low. The number of certificates in force as of year 2009 for family takaful was only 2,578,603 (Bank Negara Malaysia, 2009a) compared to 11,850,981 policies for the conventional life insurance business (Bank Negara Malaysia, 2009b).

Another variable that is suggested by TRA/TPB is the attitude towards behavior in this case the attitude towards buying or owning health insurance coverage. An individual may believe that having health insurance coverage is important for financial security thus may decide to buy health insurance. This variable is not included in the model for lack of data.

TPB has gained interest in the field of marketing because TPB incorporates cognitive psychology in explaining consumer behavior. TPB may help to answer why people buy health insurance for non economic

reasons. However empirical evidence on the application of TPB in purchasing behavior is scarce (de Canniere, De Pelsmacker, & Geuens, 2008) and so far (to the researcher's knowledge) none in the field of insurance.

In the next section, the underlying theories that lead to the model development will be discussed and subsequent sections shall focus on the demand for individual health insurance, while brief discussion on the demand for group health insurance are also reviewed.

2.3 Past Empirical Studies on Health Insurance Demand

There were abundance literatures in health insurance demand. However, the applicability of the findings is rather restrictive as the health insurance market and the health care environment differ significantly between countries. Burrows and Brown (1988, p.173), in their review of past literature relating to studies in health insurance decision makings, categorized the literature into 5 main themes:

1) studies dealing with relationship between characteristics of people and decision to insure. These include choices among different types of health insurance plans;

2) studies focusing on some aspects of information processing in choice. These are usually survey-type studies that seek information about rated importance of characteristics, reasons for choice and attitude measurement;

3) studies concerned with information available and individuals' knowledge of health insurance policies. These studies focus on how the new enrollees use available information before deciding to purchase health insurance and whether they are aware of their benefits after being covered;

4) studies that address demand for medical care, because health insurance demand is a derived demand. These studies include factors such as the choice of doctor and hospital, travel time, waiting time and perceived quality of care in their decision to purchase health insurance; and

5) studies specifically concerned with the decision process.

Based on the categories outlined by Burrows and Brown (1988) above, this study can be grouped into category (1) and the analysis focuses on the demand for individually purchased or non-group health insurance. Previous researches range from the demand for individual health insurance (Auerbach & Ohri, 2006; Besley *et al.*, 1999; Buchmeuller & Ohri, 2006; Gruber & Poterba, 1994; Jofre-Bonet, 2000; Kronick & Gilmer, 1999; Propper, 1989; Saver, Doescher, Symons, Wright, & Andrilla, 2003) to the demand for group health insurance offered by employers or employer-sponsored health insurance (ESI) (Blumberg, Nichols, & Banthin, 2001; Chernew, Frick., & McLaughlin., 1997; Feldman, Finch, Dowd, & Cassou, 1989; Marquis & Long, 1995; Monheit & Vistnes, 2000; Paringer, 2007; Pauly & Herring, 2007; Schur & Berk, 1998).

A substantial number of the studies analyzed the effect of price on health insurance demand (Auerbach & Ohri, 2006; Besley *et al.*, 1999; Blumberg *et al.*, 2001; Buchmeuller & Ohri, 2006; Gruber & Poterba, 1994; Kronick & Gilmer, 1999; Marquis, Buntin, Escarce, Kapur, & Yegian, 2004; Marquis & Long, 1995; Propper, 1989). Other studies related to health insurance demand focused on the choices made by workers in selecting the different health plans (Barringer & Mitchell, 1994; Feldman *et al.*, 1989; Schur & Berk, 1998; Short & Taylor, 1989; Sturman *et al.*, 1996).

A limited number of studies extend to analyze factors that affect the amount of insurance coverage bought given the decision to purchase health insurance (Bhat & Jain, 2006; Heim & Lurie, 2009; Liu & Chen, 2002).

2.3.1 Income Effect on Health Insurance Demand

Previous researchers have found that income is a significant factor affecting the demand for health insurance (Auerbach & Ohri, 2006; Besley *et al.*, 1999; Buchmeuller & Ohri, 2006; Kronick & Gilmer, 1999; Liu & Chen, 2002; Marquis *et al.*, 2004; Marquis & Long, 1995; Propper, 1989). The proxy variable used was either individual or household income.

In Propper (1989), family income was found to be positively associated with the probability of insurance purchase. The finding was based on the analysis of the individual demand for private health insurance

in the UK using an annual cross-sectional survey from the General Household Survey (GHS) which represents about 12,000 households in England and Wales. GHS contained data about individuals who were covered by their employers' health insurance policy (ESI) thus allowing for these group to be excluded in the analysis. In UK, those who decide to purchase private health insurance could not 'opt out' from contributing to the public sector. Despite this fact, in 1984, there were approximately 5 million people covered by private health insurance as its ownership gave better access to acute care in the UK. The researcher also explored the effect of unearned income which was measured in terms of the cost of waiting list. It was hypothesized that the cost of waiting time affects the decision to buy private health insurance in the UK as the access to the public health care was rationed by queue and waiting list. Although the effect of unearned income was small, it provided evidence on the opportunity costs forgone that was valued by the individuals.

The effect of income in the UK setting was further supported by Besley *et al.* (1999). The analysis was based on the British Social Attitude Survey (BSA) representing 3000 individuals from 1986-1991 and the health care services quality data from the Regional Trends covering years from 1986 to 1993. The research differed from Propper (1989) as it included individuals who obtained health insurance coverage from their employers (ESI). Besley *et al.* (1999) used two-stage probit model which analyzed the determinants of individual demand towards private health insurance and in the second stage analyzing whether the purchase was made through

employer or directly from the market. The findings showed that private health insurance demand was higher amongst the high income group. The demand was affected by the quality of health care services which was proxy by the waiting list at the NHS. The high income group was more likely to opt out for private health insurance to avoid the long waiting list at the NHS facilities.

Most of the empirical studies on the demand for health insurance in the US market were concentrated on employer-sponsored health insurance (ESI) plans. Studies on workers demand on ESI were important since the majority of individuals in the US obtained health coverage through their employers. Chernew *et al.* (1997) and Blumberg *et al.* (2001) presented evidence that income had positive relationship with the probability of participation in ESI. Chernew *et al.* (1997) based their analysis on the demand of low-income workers in small businesses (fewer than 25 workers) in seven cities in the US. Blumberg *et al.* (2001) expanded the data set to include the Medical Panel Expenditure Survey which was nationally representative. They found that the probability of taking ESI offer increases significantly with the income level for single workers.

Although some authors argued that the demand for ESI also reflects employers' influence in the decision whether to purchase health insurance or not, Besley *et al.* (1999) found that the effect of income on the health insurance purchase was the same in both ESI and individual private market. However, the study was conducted in the UK market. Similar comparison

was made by Pauly and Herring (2007) who attempted to determine the extent of health benefits obtained from ESI reflect individual preferences. The study was based on the US Community Tracking Study Household Surveys (CTS-HS) for year 1996 to 1997 and 1998 to 1999. It was found that significant differences in the magnitude of the odds of obtaining individuals vs. group insurance existed in the family income, ethnicity, smoking behavior and health status. Nonetheless, Pauly and Herring (2007) also found that those who obtained insurance in both the individual and group market tend to have higher income.

Perhaps a more comparable study from the US market was that of Auerbach and Ohri (2006), Kronic and Gilmer (1999) and Gruber and Poterba (1994) as they examined the non-group demand for private health insurance. In all studies, income was found to be a significant factor in health insurance demand. Kronic and Gilmer (1999) conducted a study to explain the decrease in the number of employed individuals with health insurance coverage in the US from years 1979 to 1995. The data set excluded individuals with health insurance coverage from their spouse or from the public program. The income effect was measured by the ratio of per capita health care spending to individual income. The researcher claimed that the decline in the percentage of workers with insurance coverage was due to increase in health care spending over the past 15 years which made health insurance unaffordable for low-income workers.

Gruber and Poterba (1994) focused their study on employees with family who have no access to ESI. They found that higher income families were much more likely to have insurance coverage. Similarly, Auerbach and Ohri (2006) analyzed the single workers demand for non group health insurance. The data set exclude individuals who were less than 18 years old and above 64 years as well as students under the age of 23. The authors found that the higher the income the higher the likelihood of health insurance purchase.

There are several empirical works relating to health insurance purchase in the Asian market (Jowett, 2003; Liu & Chen, 2002). Liu and Chen (2002) explored the demand for private health insurance in Taiwan. The analysis was based on the 1998 Survey of Family Income and Expenditure in Taiwan (SFIE) representing 14,031 households. Almost 65 percent of the sample owned private health insurance (vs. only 5 percent in Propper, 1989). This study differs significantly from the previous studies on the fact that it employed a two-stage empirical model. In the two-part (hurdle) model, the probability of a household having a private health insurance was estimated using logistic regression (the first part) and the factors affecting the amount of private health insurance for those who owned private health insurance was examined using OLS estimator (the second part). The researchers found that family income was a significant determinant in the decision to buy health insurance and in deciding the amount of coverage to purchase.

Further evidence on the effect of wealth on health insurance demand was carried out by Jowett (2003). In his study on the demand for voluntarily public health insurance in Vietnam, the respondents were individuals who were self-employed, employees of small organizations and the civil servants at the district level. The Vietnamese Government introduced a national health insurance in 1992. Contribution towards the national health insurance was compulsory for the civil servants and employees of large organizations. The rest of the population could choose whether to participate and contribute to the national health insurance or not. The poor were covered free of charge and as of the year 1999, there was less than 10 percent of those eligible enrolled in the program. Aside from income, the variables studied were informal risk-sharing networks and the use of social capital. The proxies for social capital were the perception on the strength of social cohesion and the index of networks at commune level. The study found a negative association between the probability of insurance purchase and informal risk-sharing networks. The finding suggested that individuals were unlikely to purchase health insurance when they can highly rely on the community for financial supports.

The research in health insurance demand has not been given due attention in Malaysia. There were two studies in health insurance in Malaysia. A case study on group health insurance was conducted by Arpah Abu Bakar, Habibah Tolos and Lakehal-Ayat (2002). The researchers studied the management of health benefits program at a public institution. The study was conducted to develop a case study for class purposes. The

study was limited in scope since it covered only one institution and it was more on the perspective of the employer rather than decision to buy by the employees. Another study (Arpah Abu Bakar *et al.*, 2004) explored the demographic factors of the individuals who had health insurance. Nevertheless, the study is limited in scope and is not representative of the Malaysian case as it used convenience sampling technique.

2.3.2 The Effect of Socio-Demographic Factors on Health Insurance Demand

A considerable portion of the literature in health insurance demand has examined the effect of demographic characteristics such as age and gender, as well as other socio-demographic variables, including marital status, employment status, ethnicity, location of residence and educational attainment on the decision to purchase health insurance.

Age and gender, being risk factors in insurance underwriting, were the most important predictors being analyzed in the health insurance demand studies. Findings from previous researchers showed that age was positively related to health insurance purchase (Auerbach & Ohri, 2006; Besley *et al.*, 1999; Cutler & Gruber, 1996; Liu & Chen, 2002; Long & Marquis, 2002; Marquis *et al.*, 2006; Marquis *et al.*, 2004; Marquis & Long, 1995).

On the contrary, Chernew et. al. (1997) found that age has no significant relationship with the probability of participation in ESI. The

difference in findings may be due to the fact that age is not a risk factor in group health insurance. The premium rating in group health insurance depends on the overall experience of the group.

In practice, a female individual health insurance premium rate is higher than a male individual. Actuarially, women face higher health risks than the male counterparts. The research findings on the effect of gender on health insurance demand are not consistent. In several studies, a female individual was found to be more likely to purchase health insurance coverage (Auerbach & Ohri, 2006; Liu & Chen, 2002; Long & Marquis, 2002; Marquis & Long, 1995). However, Cutler and Gruber (1996) and Dewar (2000) found otherwise. Dewar (2000) found that gender and gender-based segregation among industrial classes significantly influence the likelihood of insurance coverage. The author asserted that women were less likely to be covered by ESI because they were usually in female-dominated industries which offer limited fringe benefits.

Besides age and gender, marital status was also found to influence the decision to purchase health insurance. Gruber and Poterba (1994) reported that insurance coverage rise with marriage. However, Buchmueller and Ohri (2006) found that married individuals were less likely to take-up coverage and that married men were more likely to purchase health insurance than married women. The findings from Buchmeuller and Ohri (2006) should be taken with caution as the data set only covered elderly retires between the age of 55 and 64 which in turn may explain the different

result. The positive relationship between marriage and health insurance demand was further supported by Liu and Chen (2002) who found that married individuals were more likely to purchase health insurance and tend to buy more coverage.

Ethnic background has been identified as one of the factor that influence health insurance demand (Auerbach & Ohri, 2006; Cutler & Gruber, 1996; Gruber & Poterba, 1994; Monheit & Vistnes, 2000; Paringer, 2007; Saver *et al.*, 2003). In the US setting, researchers found that the health insurance coverage was higher among white than nonwhite individuals (Auerbach & Ohri, 2006; Gruber and Poterba, 1994). Similar finding was reported by Cutler and Gruber (1996) who investigated the effect of public health insurance eligibility on private health insurance coverage. They found that the whites were more likely to have private health insurance coverage compared to Medicaid or being uninsured. Medicaid is a social health insurance coverage offered to the poor people in the US. The study provides better comparison with other countries which majority has public health care as those who are covered by Medicaid can receive free medical care. The finding was further supported by a study by Monheit and Vistnes (2000) who analyzed health insurance status of nonelderly white, black, and Hispanic Americans in 1987 and 1996. The authors found that the minorities were more likely to be uninsured compared to the white Americans and the gap was significant in both years.

Household size was also found to be a significant determinant of health insurance purchase (Besley *et al.*, 1999; Cutler & Gruber, 1996). Besley *et al.* (1999) found that families with larger household size were less likely to have health insurance coverage as they usually have a lower standard of living indicating an income effect. Perhaps large family size allows for higher reliance on other household members on financial assistance and supports as evidence in Jowett (2003). Similarly, Cutler and Gruber (1996) found that household with fewer people were more likely to have private health insurance compared to Medicaid or being uninsured.

Previous researchers have also found that differences exist in the demand for health insurance among those with various educational attainments. Individuals with higher level of education were more likely to own health insurance (Auerbach & Ohri, 2006; Besley *et al.*, 1999; Dewar, 1998; Gruber & Poterba, 1994). Education has been widely perceived as one of the important socio-demographic determinants of health insurance purchase most probably because the highly educated were better informed of their health related risks thus become more risk averse. Moreover, they were more likely to understand the benefits of, and have access to health insurance coverage.

Besides demographic factors, individuals' employment characteristics were also found to influence health insurance purchase. In Propper (1989), employment of the head of family and spouse was found to be positively associated with the probability of health insurance purchase

compared to the unemployed while self-employment was found to be negatively associated with purchase as opposed to employed workers. Similar finding was reported in Gruber and Poterba (1994) although the study was conducted in a different market (US market).

Aside from being employed, working full time was also found to influence the decision to purchase health insurance. Kronic and Gilmer (1999) showed that part-time workers were less likely to have insurance as compared with the full-time workers. Similarly, Chernew et. al. (1997) found that salaried workers were more likely to participate in ESI. In the UK market, working in the public sector were negatively associated with health insurance purchase (Besley et. al., 1999) while in Taiwan, Liu and Chen (2002) reported that individuals employed in state-run enterprise were more likely to purchase health insurance compared to the government and private sector employees. In addition, Kronik and Gilmer (1999) found that workers in the service sectors in the US market were less likely to have health insurance coverage than the average workers.

The effect of location of residence on the decision to purchase health insurance has been inconsistent in previous studies. Liu and Chen (2002) found that regional effect have influence in the decision to buy health insurance and in deciding the amount of coverage to purchase. They argued that those living in the more urban area are more likely to buy health insurance due to availability of information on the advantages of health insurance. The rural residents were found to buy more health insurance

coverage due to their engagement in higher occupational risk jobs. However, Propper (1989) and Auerbach and Ohri (2006) showed that location of residence had no clear relationship with purchase. Since the studies were conducted in three different countries, the differences in the health care and health insurance market may have influence their findings.

2.3.3 The Effect of Health Status & Health Utilization on Health Insurance Demand

Another important determinant of health insurance demand is the health status and health care utilization. Empirical evidence provides inconsistent estimate on the effect of these variables on the demand for health insurance. Propper (1989) found that there was no clear relationship between health status and health insurance purchase. However, Marquis and Long (1995) found that families with one or more members in poor health were significantly less likely to purchase health insurance. In Propper (1989), health status was measured by self-assessed health status and utilization of health care services. Both measures showed no significant relationship with health insurance purchase.

Prospect theory suggests that the current state of individual may influence his/her decision with respect to evaluation on gains and losses. The perceived health status and/or the future health consumption reflect the potential losses an individual may face. Therefore, individuals who perceived themselves as having poor health will be more likely to buy health insurance as the benefits of health insurance coverage are greater for

these individuals. However, as evidence in Marquis and Long (1995), underwriting requirements may make individually purchased insurance less accessible to these individuals as the health insurance application form request information on pre-existing conditions.

Health utilization measures were mostly used in studies attempt to determine the effect of health insurance on medical care utilization. As such, the utilization variable which can be measured by past medical expenditures and/or OOP cost, doctor consultation and/or hospitalization becomes the dependent variables (Cameron, Trivedi, Milne, & Piggott, 1988; Manning, Newhouse, Duan, Keeler, & Leibowitz, 1987). However, Marquis and Long (1995) suggested that the expected out-of-pocket expenditures is one of the key explanatory variable in the health insurance demand model based on the expected utility framework.

2.3.4 The Effect of Health Care Providers' Quality on Health Insurance Demand

Beside socio-demographic factors, quality of health care provider has been used to examine the demand for private health insurance (Besley *et al.*, 1999; Jofre-Bonet, 2000). Besley *et al.* (1999) investigated the demand for private health insurance as a function of the waiting list at the public hospitals in addition to individual's characteristics. The researchers found that the longer waiting list for public treatment, the greater the purchases of private health insurance. Similar results were found in Jofre-Bonet (2000) who conducted a similar study in Spain using the Spanish Health Survey 1993 and the Spanish Family Budget Survey 1990-91. The researcher used

the difference of waiting time between public and private providers as the proxy for the quality of health services. A shorter waiting time at the public health care reduced the demand for private health insurance. The researcher suggested that improving the quality of public health care by reducing the waiting time may result in a shift from private health insurance to public health insurance.

2.3.5 The Price Elasticity of Health Insurance Demand

While the effect of income on health insurance purchase was more consistent in previous studies, the price effect varied somewhat. Price elasticities ranged between –0.3 to –0.4 in Marquis and Long (1995) and -0.4 to -0.6 in Gruber and Poterba (1994) while Auerbach and Ohri (2006) found price elasticity of -0.59 and Heim and Lurie (2009) reported take-up elasticity of -0.333. A lower price elasticity was found in Blumberg *et al.* (2001). To a large degree, the differences in the estimates were due to difference in the study populations.

Marquis and Long (1995) examined the demand for health insurance coverage by workers who were not offered health insurance coverage by their employers. The findings implied that a 10 percent decrease in premium would lead to 3 to 5.9 percent increase in the purchase of health insurance. The higher price elasticity found in Auerbach and Ohri (2006) may be due to the unit of analysis being an individual compared to a family in Marquis and Long (1995). Auerbach and Ohri (2006) estimated the price elasticity of demand for non group health insurance for single workers who were not

offered ESI. The price variable was imputed using the premium of a typical RM1,000 deductible policy obtained from a large insurer in year 2003. The premiums were adjusted by a factor that reflects health care cost in each states. Marquis and Long (1995) further concluded that substantial subsidies may not induce workers to purchase health insurance coverage voluntarily due to the low price elasticity. Nevertheless, further evidence by Auerbach and Ohri (2006) showed higher price elasticity for poor individuals (-.87) which suggested that price subsidy may result in higher take-up rate for this group.

In Blumberg et al (2001), two proxies for price used in the study were out-of-pocket premium and total premium. The low income group showed the greatest price elasticity implying that those with low income were more sensitive to price. In addition, the researchers suggested that workers were more likely to respond to out-of-pocket premium than total premium. Despite the fact, price elasticity found in studies investigating the demand for ESI was much lower than in the demand for insurance directly purchased in the market. Price elasticity of -0.043 was recorded in Blumberg et al (2001) while Chernew et al (1997) found price elasticity of -0.03 to -.095. This may be due to the fact part of the premium paid comes from the employer contribution.

A different approach was taken by Gruber and Poterba (1994) who used the after-tax price of insurance in their analysis. The main intention of the study was to investigate the effect of the 1986 Tax Reform Act in the US

that allowed the self-employed to deduct a portion of their premium payments from their income taxes. The researchers controlled for potential effect from the economic changes that may affect the health insurance coverage by comparing the demand for health insurance by the self-employed to the employed individuals. The researchers found that an increase in the after-tax price of insurance reduced the probability that a household would purchase health insurance coverage. Further evidence indicated that the low income self-employed individuals were more sensitive to the after-tax price change compared to the high income self-employed individuals. Specifically, the researchers found that a 1 percent increase in the after-tax price will reduce the probability of a self-employed single individual to be insured by 18 percentage point.

2.3.6 The Factors that Affect the Amount of Health Insurance Coverage

There are a very limited number of researches in health insurance demand that analyze the factors that affect the amount of health insurance coverage purchased by individuals. Heim and Lurie (2009) conducted the analysis in the US market, Bhat and Jain (2006) in the Indian market and Liu and Chen (2002) in the Taiwanese market. Liu and Chen (2002) found that income, marital status, gender, employment status and location of residence were statistically significant in influencing the level of health insurance coverage purchased by individuals. However, age, health care utilization and family size were found to be not significant determinants.

A somewhat similar findings were recorded in Bhat and Jain (2006). The researchers studied the factors that affect the demand for private health insurance in a micro insurance scheme setting in India. The analysis covered both the decision to purchase and on the amount of coverage. The micro insurance scheme was aimed at poor sections of the population in an effort to ensure that they are covered by a community program at low cost. Although it was only a working paper series, the findings did provide some preliminary evidence on the factors that affect the amount of health insurance coverage. The researchers found that income, age, number of children and expected future health care expenditures were statistically significant in influencing the level of insurance coverage to be purchased.

Heim and Lurie (2009) analyzed the effect of increases in the tax deductibility of premium from the self-employed which was first introduced by the Tax Reform Act 1986. The data used was the 1999 Edited Panel of tax returns which covers 6 years of records. The objective of the research was to estimate the effect of after-tax price of health insurance on the take-up of coverage and the amount of coverage purchased. Other variables included in the analysis were age, filing status, income and year dummy variable. The price elasticity of -0.733 was recorded. The researchers concluded that although tax deduction changes the price of insurance it had a moderate effects on the number of insured self-employed taxpayers as well as on the amount of insurance purchased. Although this study based its framework from Gruber and Poterba (1994) it did not compare the demand between the self-employed and the employed and it used different measures

of price. And more importantly, it extended to estimate the effect of price on the amount of insurance coverage purchased.

As evidence from health insurance purchase studies are rather limited, some reference may be taken from the studies in the choice of health insurance plans. In these studies, analysis was made on the factors that affect the employees choosing a particular health plan. It was found that women were more likely to choose high coverage plan than men (Barringer & Mitchell, 1994; Sturman *et al.*, 1996). Sturman, Boudreau and Corcoran (1996) studied the choices made by Dannon Company's employees on health plans that differed only in terms of their premium, deductibles and rates of reimbursement. The employees had only two choices and the actual costs that the employees incurred after selecting a plan were used as out-of-pocket costs. The costs include the premium paid, the medical charges and the reimbursement from the plan. The researchers used a measure called 'financial regret' which was the financial consequences of making a not-cost-optimal choice. The 'financial regret' would be zero if an employee chose an option that minimized his or her out-of-pocket costs. The study found that employees were more likely to choose the lowest-cost plan if they were given a choice. In addition, it was found that males employees with more children and had higher potential financial regret were significantly and positively related to the probability of choosing a plan that produce the minimum out-of-pocket costs. On contrary, women were more likely to choose a more expensive and higher coverage plan.

2.4 Chapter Conclusion

In this chapter, the relevant theories in health insurance demand were discussed. Despite the criticism on the EU theory, there are still contradictory opinions on the theory that best explains the decision behavior in the purchase of health insurance (cited in Schneider, 2004). The preceding discussion shows that the EU theory alone may not suffice to explain the behavior of an individual in health insurance purchase. Other theories that were developed provide further predicting power. Thus, by incorporating other theories it may assist in better understanding on the decision made. Nonetheless, the EU theory shall remain central in the economic decision behavior studies.

In section 2.3, the empirical evidence on health insurance demand is centered on four selected countries, the UK, US, Taiwan and Vietnam. These countries were selected to present the diversity of the health care environment. In the UK market, public health care is free. The NHS is financed via tax contribution. The private health insurance is voluntary. The US market differs where health care is managed by the private market – from the health care provider to the financier. Although public assistance is provided through Medicare (for the elderly) and Medicaid (for the poor), the private health care providers are dominant and the majority of private health insurance coverage is provided by the employers. In Taiwan, the social insurance program started in 1995, much later than the private insurance market which was established in year 1967 (Liu & Chen, 2002). Although the National Health Insurance (NHI) guarantee access to all Taiwanese, the

program incorporates various co-payments resulting in higher out-of-pocket (OOP) cost and raises the need for private health insurance to supplement the coverage. Besides, NHI differs from the NHS program in the UK for the fact that it requires premium contribution. Vietnam on the other hand provides a different setting. The health care was highly funded by user charges and public health insurance was introduced to curb the OOP cost. However, the participation in the public health insurance is voluntary.

The literatures cover studies on factors that affect the demand for individual health insurance including the effect of price on the decision to buy. A limited number of literatures discusses on factors that affect the amount of health insurance coverage. In a nutshell, the previous empirical studies shows that the health insurance demand were influenced by income level, various socio-demographic factors, health status, and price.

CHAPTER 3

RESEARCH FRAMEWORK AND METHODS

3.1 Introduction

This chapter presents the theoretical framework and the methodology employed in this study. The first section outlines the research model and defines the independent variables with their respective reference sources follows by the details development of the hypotheses. The following section details the measurement of variables and the statistical analysis applied in this research. The final section concludes.

3.2 Research Framework

The theories and literatures discussed in Chapter Two motivate the development of the health insurance demand model used for this study. The theoretical framework for the factors that affect the decision to purchase is presented in Figure 3.1 and the factors that affect the amount of coverage given the decision to buy is presented in Figure 3.2.

Figure 3.1
Theoretical Framework for Decision to Buy

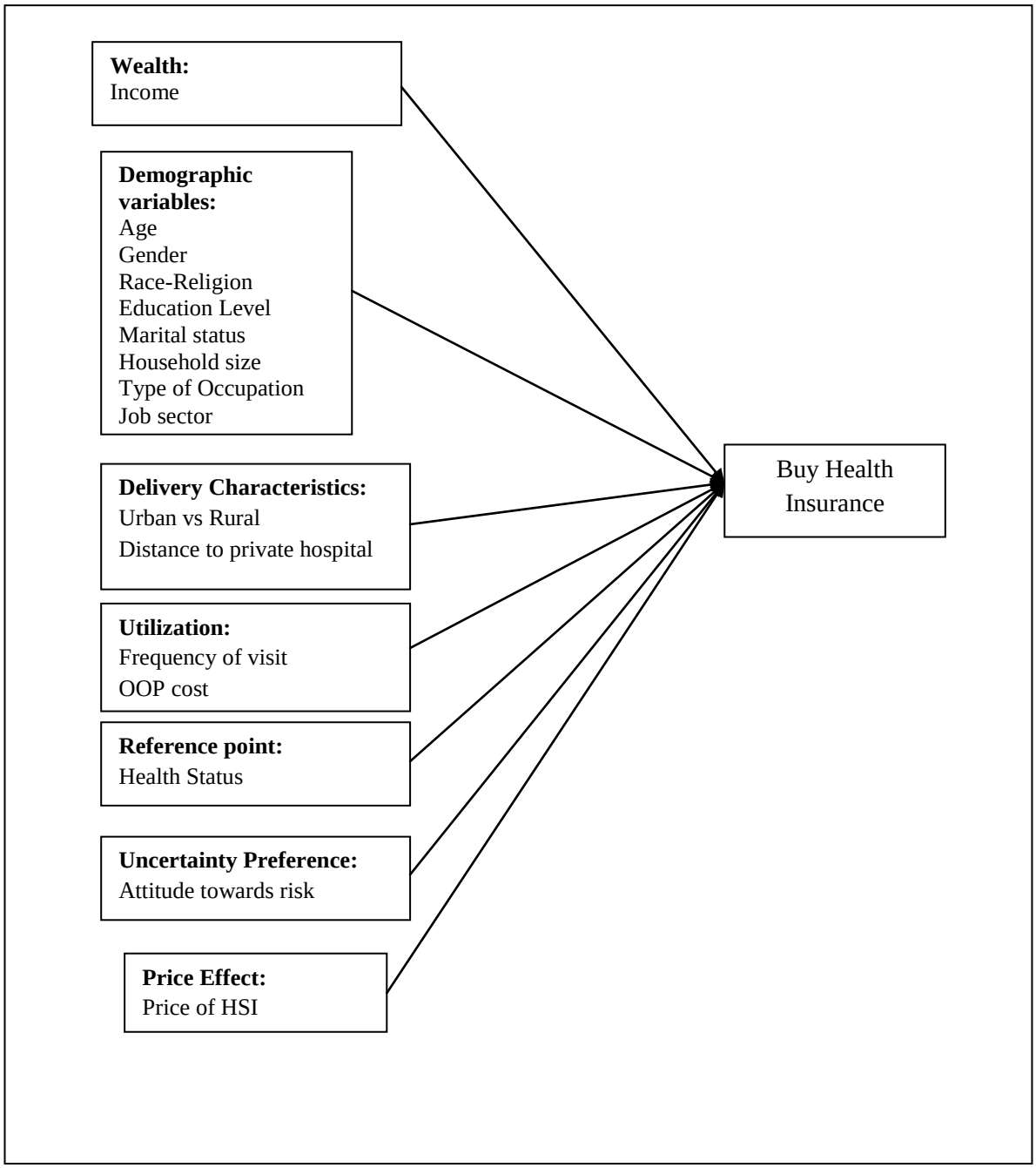
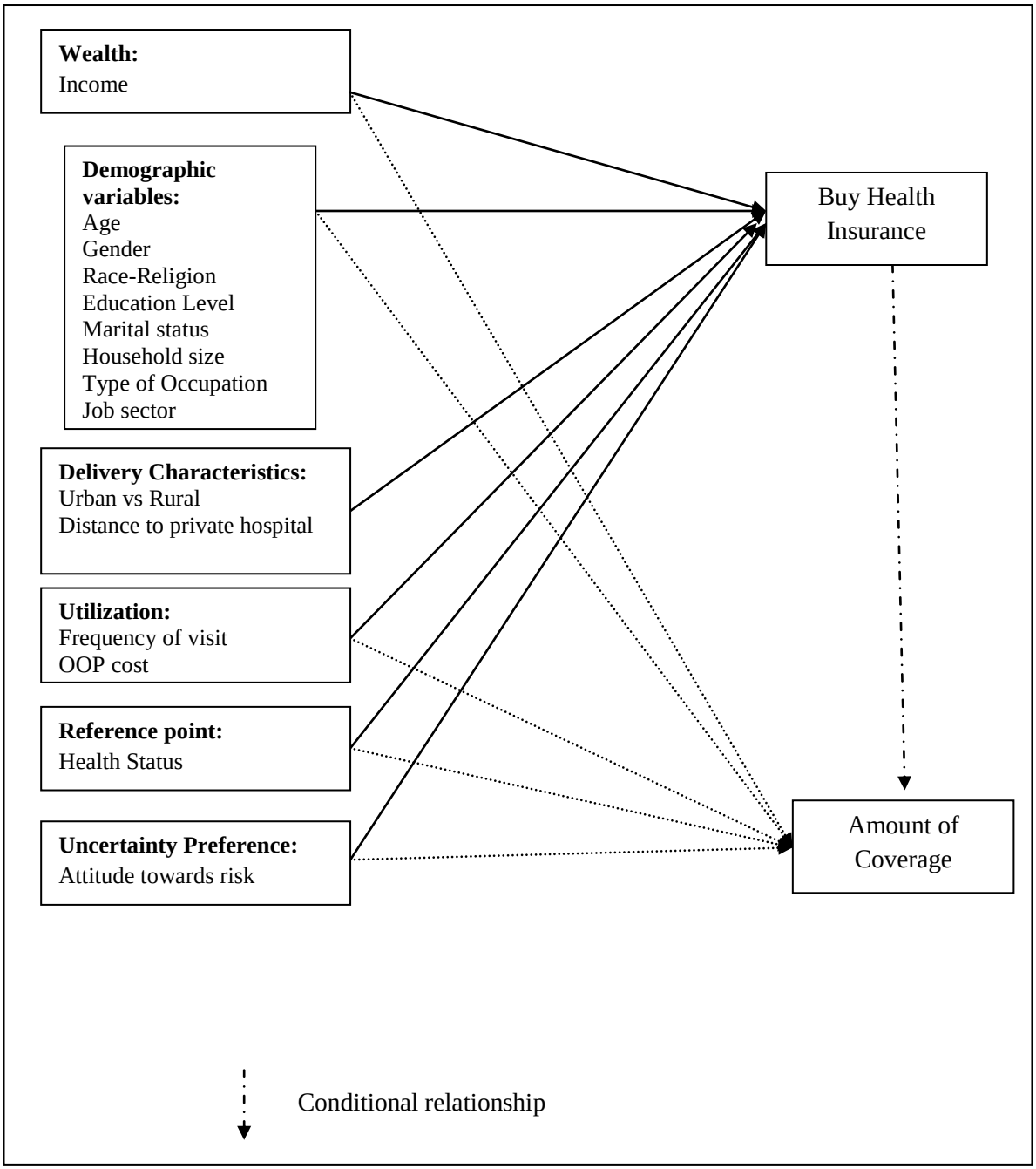


Figure 3.2
Theoretical Framework for Amount of Coverage Given the Decision to Buy



3.2.1 Theoretical model

The theoretical framework of the study aims to reveal the factors that influence the individual's decision to purchase private health insurance and also on the amount of health insurance coverage bought. The relationship between the dependant and the independent variables are portrayed in Figure 3.1.

The first model explains the decision to purchase private health insurance. The dependant variable is the discrete choice of either buying health insurance (1) or to remain uninsured (0). As the dependant variable is discrete, a nonlinear probability model is employed in this study.

Two commonly used nonlinear probability models are probit regression and logistic regression. These models are estimated using maximum likelihood (ML) rather than ordinary least square (OLS). With large samples, ML estimator tends to be unbiased, consistent, efficient and normally distributed (DeMaris, 2004).

For the first model, logistic regression is applied to find the factor(s) that have significant effect on the decision to buy health insurance. Propper (1989) employed logit model in the analysis of private health insurance demand in the UK. Similar technique was used in Jofre-Bonet (1999) and Kronick and Gilmer (1999). However, Auerbach and Ohri (2006) and Buchmueller & Ohri (2006) utilized probit regression. Nevertheless, logistic regression is chosen over probit regression because it has an advantage in

terms of interpretability. The "… exp(β) can be interpreted as the multiplicative impact on the odds of an event for a unit increase in *x*, net of other covariates" (DeMaris, 2004, p. 264).

Multiple discriminant analysis can also be used to predict group membership of only two groups. However, it can only be used with continuous independent variables. As the independent variables in this study are a mix of continuous and categorical variables, logistic regression is preferred. Further, the independent variables in the logistic regression can take any form, meaning logistic regression makes no assumption about the distribution of the independent variables. The model is as follows:

Log [odds(y=1)] = Logit (Π) =

$$y_i = \beta_0 + \beta_1 \chi_{i1} + \beta_2 \chi_{i2} + \beta_3 \chi_{i3} + \beta_4 \chi_{i4} + \beta_5 \chi_{i5} + \ldots + e \qquad (1)$$

where,

y = 1 = purchase health insurance
y = 0 = do not purchase health insurance
Π = the probability of buying health insurance
β = coefficients / scalars
χ = regressors / predictors

The odds that y=1; is the ratio of the probability y=1 to the probability that y=0:

$$odd(y = 1) = \frac{\Pr\,(y=1)}{\Pr\,(y=0)}$$

The probability of buying health insurance can be measured as:

$$\pi = \frac{1}{1 + \ell^{-y_i}}$$

From this model, the factors that affect the individual demand for health insurance can be determined. The table below lists the explanatory variables to be used in Model 1. Chapter two has provided extensive discussion of the health insurance demand theories and the empirical evidence that guides the selection of these independent variables.

Table 3.1
Independent Variables and Supporting Theories and Literatures

Independent Variables	Theories	Past Literatures
X_1 = income	Prospect Theory	Propper (1989); Besley *et al.* (1999); Kronic & Gilmer (1999); Auerbach & Ohri (2006); Buchmueller & Ohri (2006); Gruber & Poterba (1994); Marquis & Long (1995); Marquis et.al. (2004 & 2006); Liu and Chen (2002)
X_2 = age	EU Theory Bounded Rationality Theory (BRT)	Long & Marquis (2002); Cutler & Gruber (1996); Auerbach & Ohri (2006); Buchmueller & Ohri (2006); Marquis & Long (1995); Marquis et.al. (2004 & 2006); Liu and Chen (2002); Besley et al (1999)
X_3 = gender	EU Theory	Long & Marquis (2002); Cutler & Gruber (1996); Auerbach & Ohri (2006); Buchmueller & Ohri (2006); Gruber & Poterba (1994); Liu and Chen (2002);
X_4= religion (ethnicity)	Theory of Reasoned Action	Long & Marquis (2002); Cutler & Gruber (1996); Auerbach & Ohri (2006); Gruber & Poterba (1994); Marquis & Long (1995); Marquis et.al. (2004 & 2006); Pauly & Herring (2007)
X_5 = highest education level	BRT	Jofre-Bonet (1999); Long & Marquis (2002); Cutler & Gruber (1996); Gruber & Poterba (1994); Marquis & Long (1995); Marquis et.al. (2004 & 2006); Liu and Chen (2002); Besley et al (1999); Pauly & Herring (2007)
X_6 = marital status	EU Theory	Cutler & Gruber (1996); Buchmueller & Ohri (2006); Gruber & Poterba (1994); Marquis et.al. (2004 & 2006); Liu and Chen (2002)
X_7= household size	EU Theory	Cutler & Gruber (1996); Liu and Chen (2002)
X_8 = type of occupation	BRT	Propper (1989); Kronic & Gilmer (1999); Gruber & Poterba (1994); Marquis et.al. (2004 & 2006); Liu and Chen (2002)

Table 3.1 (Continued)

Independent Variables	Theories	Past Literatures
X_9= job sector	BRT	Liu and Chen (2002); Besley *et al.* (1999)
X_{10}= urban vs rural	BRT	Propper (1989); Cutler & Gruber (1996); Auerbach & Ohri (2006); Liu and Chen (2002); Pauly & Herring (2007)
X_{11}= distance to the private hospital	BRT	
X_{12}= frequency of visit to inpatient and outpatient	EU Theory Prospect Theory	Liu and Chen (2002)
X_{13}= out-of-pocket cost	EU Theory Prospect Theory	Marquis & Holmer (1986); Ellis (1989); Marquis & Long (1995)
X_{14} = health status	Prospect Theory	Propper (1989); Long & Marquis (2002); Auerbach & Ohri (2006); Marquis & Long (1995); Marquis et.al. (2004 & 2006);
X_{15}= attitude towards risk - smoker and nonsmoker - safety behavior	EU Theory Prospect Theory	Propper (1989); Pauly & Herring (2007)
X_{16} = price of hospital and surgical policy	EU Theory	Auerbach & Ohri (2006); Buchmueller & Ohri (2006); Gruber & Poterba (1994); Marquis & Long (1995); Marquis et.al. (2004 & 2006)

The second model is proposed to further refine the understanding on the individuals' health insurance demand. This model will determine the factors that affect the level or amount of health insurance purchased given the decision to purchase health insurance. The dependant variable is the amount of health insurance premium paid.

Since the data on the insurance premium paid is only available for those who purchased health insurance only, these data is a censored data. Censoring occurs when data on the dependent variable is lost (or limited) but the data on the independent variables can still be observed.

The high number of non purchasers suggests that tobit regression model may be appropriate. The tobit regression model was developed by James Tobin (1958). The Tobit model is a special case of a censored regression model, because "the latent variable y_i^* cannot always be observed while the independent variable x_i is observable. The observable variable y_i is defined to be equal the latent variable whenever the latent variable is above zero and zero otherwise."

Let;

$$y_i^* = \beta x_i + \varepsilon_i \ , \ \varepsilon_i \sim N(0,\sigma^2)$$

$$y_i = \begin{cases} y_i^* \ if \ y_i^* > 0 \\ 0 \ if \ y_i^* \leq 0 \end{cases}$$

where,

y_i = the insurance premium paid by the respective individuals

The tobit model is an alternative to ordinary least squares regression (OLS) when dependent variables holds the value of zero for a large proportion of the observations (Greene, 2008). The MLE estimator in the Tobit model is superior than the OLS estimator as it provide more consistent estimates (Amemiya, 1994).

However, in the standard Tobit model, the same set of variables "is held to determine both the probability of truncation and the expected value of the realized dependent variables, conditional on its having been observed" (Breen, 1996, p. 33). In this study, as the observed y_i depends upon the value of another variable z_i, the sample selection model is more appropriate. In sample selection model, "the effects of variables on each of the two steps can be different, and so that different variables can influence each of the steps" (Breen, 1996, p. 33). The sample selection model is also known as Type 2 Tobit Model (Amemiya, 1994). According to Breen (1996),

> The simplest form of a sample selection model has two stages: In the first stage, a dichotomous variable z, determines whether or not y_i is observed and in the second stage, the expected value of y_i is modeled conditional on its having been observed, y_i is observed only if $z_i = 1$.
>
> Let;
>
> $z_i^* = w_i \alpha + \mu_i$
>
> $$z_i = \begin{cases} 1 \; if \; z_i^* > 0 \\ 0 \; if \; z_i^* \leq 0 \end{cases}$$
>
> $y_i = y_i^*$ if $z_i = 1$
>
> y_i not observed if $z_i = 0$
>
> (p. 34)

The sample selection model can be estimated via Heckman two-step estimator (Heckit) or via ML estimator (Green, 2008). Heckit involves probit model that employs the full sample cases in the first step and then

using OLS for those with observable values and adding the inverse Mill's ratio as a regressor in the OLS equation (DeMaris, 2004, p. 336). The inverse Mill's ratio is a correction for the sample selection bias. The sample selection bias occurs when there is nonrandom selection due to sampling errors and in situation where certain relevant variable is omitted by chance.

The error in the selection equation μ, is assumed to be correlated with the error in the outcome equation ε. The two sets explanatory variables can be different (in cases where exclusion restriction exist) or they can be identical. If the correlation between the error in the outcome equation and in the choice equation, ρ, is zero; then we have Cragg's model (Breen, 1996). Cragg (cited in Breen, 1996) treated the two stages as independent of each other in his study whereby the decision to purchase a car was assumed as independent of the decision on how much was spent in a car. The independence assumption between the selection equation and the outcome equation leads to the so-called two-part model. In the two-part model, no correction for sample selection bias is needed.

There have been disagreement between scholars on the use of sample-selection model over two-part model (Leung & Yu, 1996; Madden, 2008). Several authors employed two-part model (Hurd & McGarry, 1997; Liu & Chen, 2002; Manning *et al.*, 1987) while others use two-stage model (Besley *et al.*, 1999; Bhat & Jain, 2006; Dewar, 1998; Koc, 2005). Liu and Chen (2002) analyzed the decision to purchase health insurance in Taiwan and the amount of premium paid in a two-part model. In Besley et al (1999)

and Dewar (1998), the first stage was the probit regression on the probability of purchasing private health insurance and the second stage was the probability of buying ESI among those who purchased private insurance. The two-part model assumes that the decision to buy is independent of the decision on the level of spending (premium paid). Although this assumption is rather restrictive, the two-part model performs better than the two-stage model in situation of highly potential collinearity problems (Leung & Yu, 1996).

In this study, the level of premium bought, y_i is modelled as conditional on the decision to buy health insurance, z_i. In other words, the decision to own health insurance and the decision on the amount of coverage is first assumed to be done simultaneously. However, the final model will depend on the result of the inverse Mill's ratio. If the inverse Mill's ratio is insignificant, the outcome equation and the selection equation is independent thus the correction for sample selection bias is not needed. In this latter case, the factors that affect the amount of health insurance bought can be estimated using the OLS estimator.

3.2.2 Hypotheses

The following hypotheses are formulated in order to answer research questions number 2 and 5.

Hypothesis 1: An individual with higher income is more likely to purchase health insurance.

Income was found to be a significant determinant of the probability of health insurance purchase in Propper (1989), Chernew *et al.* (1997), Besley *et al.* (1999), Kronick and Gilmer (1999), Blumberg *et al.* (2001) and Auerbach and Ohri (2006).

It is hypothesized that income is positively related to the probability of health insurance purchase and the amount of health insurance coverage. Other things being equal, the higher the individual income, the higher the likelihood of buying health insurance and the higher the level of coverage bought. Individuals with high income will have a higher state of utility when insured because they can ensure access to the needed care in a timely manner while at the same time the money spent to obtain the health insurance coverage may have less impact to the initial wealth compared to the lower income individual. In other words, high income individuals have higher level of affordability. Furthermore, high income individuals may perceive the choices whether to be insured or not as gain alternatives thus they become risk averse and turn out to be a higher potential buyers than the low income earners.

Hypothesis 2: An older individual is more likely to purchase health insurance.

Age was found to be a significant determinant in Auerbach and Ohri (2006), Marquis *et al.* (2004), Besley *et al.* (1999) and, Cutler and Gruber (1996). Marquis and Long (1995) and Liu and Chen (2002) found that families with an older head of household were more likely to purchase health insurance.

The effect of age on the probability of health insurance purchase may concurrently be affected by the price of the health insurance policy. The price of health insurance policy usually increases as the age increases. Thus, if an individual wants to obtain health insurance coverage at a later age, the health insurance coverage can be rather expensive leading to a negative relationship between age and the likelihood of buying.

However, previous researchers have shown that age was positively related with the probability of purchase (Auerbach & Ohri, 2006; Liu & Chen, 2002; Marquis & Long, 1995). This result may reflect higher needs for health care as older individuals are more prone to health risks.

The relationship between age and the likelihood to buy health insurance may not be linear in nature. The older the individuals the higher likelihood of health insurance purchase. However, up to certain age, the likelihood of buying may decrease as the price of the health insurance policy becomes too expensive. Thus, it is hypothesized that age is positively

related to the probability of purchase up to certain maximum age and then starts to decline. The positive relationship is due to the fact that the decision to be insured result in a higher state of utility for older individual due to higher health risk exposures compared to younger individual. However, as the price increases too much, the utility of being insured becomes lesser. Similar relationship is hypothesized for the level of coverage.

Hypothesis 3: A female individual is more likely to purchase health insurance compared to a male individual.

Previous researchers found that women or a family with female as the head of household was more likely to purchase health insurance (Auerbach & Ohri, 2006; Liu & Chen, 2002; Long & Marquis, 2002; Marquis & Long, 1995). They also tend to purchase a more expensive and comprehensive plan (Liu & Chen, 2002; Sturman et al, 1996; Barringer & Mitchell, 1994).

Women were more likely to purchase health insurance than men due to the higher health risk exposure and in a family context probably due to being more risk averse. Therefore, it is hypothesized that female individual is more likely to buy health insurance and will buy a higher amount of coverage.

Hypothesis 4: Variable race-religion has significant relationship with health insurance purchase.

Previous studies have found that ethnicity influence the decision to purchase health insurance. In the US market, studies showed that health insurance coverage was higher among the white than nonwhite individuals (Auerbach & Ohri, 2006; Gruber & Poterba, 1994; Monheit & Vistnes, 2000).

In the Malaysian context, it is hypothesized that the Malays, of whom the majority are Muslim, are less likely to purchase health insurance coverage. This is thought to be the case as evidence is found in a study of life insurance in the Middle Eastern countries showed that ownership was significantly less among the Muslims (Browne & Kim, 1993).

Hypothesis 5: An individual who has higher level of education is more likely to purchase health insurance.

It is hypothesized that higher education level is associated with higher likelihood of health insurance purchase and higher amount of health insurance coverage. Those with higher education are usually having better awareness on the needs for health insurance due to better information processing capacity. Educated individuals are more likely to be efficient users of health-related information and thus are more informed of their likelihood of health-related risks. Besides, they are more likely to

understand the benefits of health insurance and thus will seek to have better access to health care through adequate health insurance coverage.

Education was found to be a significant determinant of the probability of health insurance purchase in Auerbach and Ohri (2006), Gruber and Poterba (1994), Marquis *et al.* (2004), Besley e. al. (1999) and Dewar (1998).

Hypothesis 6: A married individual is more likely to purchase health insurance compared to a single individual.

Marriage can increase risk aversion due to the negative influence that illness of one spouse may have on the happiness of their partner. Thus, it is hypothesized that a married individual is more likely to purchase health insurance and will also have a more comprehensive coverage. In previous studies, married individuals were found to be more likely to purchase health insurance (Gruber & Poterba, 1994; Liu & Chen, 2002). Liu and Chen (2002) further reported that married individuals tend to purchase higher amount of coverage.

Hypothesis 7: An individual with bigger household size is less likely to purchase health insurance.

Previous studies have found that number of adult and children in a household affect the decision to purchase health insurance (Besley *et al.*, 1999; Cutler & Gruber, 1996). Besley *et al.* (1999) found that families with larger household size were less likely to have health insurance coverage. It

was justified that larger families usually have lower standard of living indicating income effect. Perhaps, it may also due to higher reliance on each household members for supports including financial support as evidence in Jowett (2003) whereby individuals in Vietnam were less likely to purchase health insurance coverage when they can depend on the community for financial support.

Thus, it is hypothesized that household size is negatively associated with the decision to purchase health insurance and with the amount of health insurance coverage purchased.

Hypothesis 8: An individual who is employed in the service sector is less likely to purchase health insurance.

Theoretically, types of occupation affect the insurance purchasing decision due to the various levels of risk exposures. Workers in higher risk occupations are more likely to purchase insurance to financially protect them against potential medical expenditures than those in lower risk occupation. Those working in the service sectors face lower risks thus may be less likely to own health insurance. In Kronick and Gilmer (1999), it was found that workers in the service industries were 5 percent less likely to have health insurance coverage than the average workers. Thus, it is hypothesized that an individual who is employed in the service sector is less likely to purchase health insurance.

Hypothesis 9: An individual who is employed in the public sector is less likely to purchase health insurance.

Besley *et al.* (1999) who conducted a study in the UK market, found that individuals who worked in the public sector were negatively associated with health insurance purchase. In Liu and Chen (2002), those working in the state owned enterprise were more likely to be insured compared to those employed in the government agencies and the private sectors.

In the Malaysian context, those working in the public sector have almost free access to the public health institution thus making the private health insurance less important. Thus, it is hypothesized that the public servants are less likely to purchase health insurance.

Hypothesis 10: An individual living in an urban area is more likely to purchase health insurance compared to an individual living in a rural area.

Hypothesis 11: An individual living closer to a private hospital is more likely to purchase health insurance.

As suggested by the Bounded Rationality Theory, an individual is constraints by many factors in making decision thus may chose alternative that satisfy not maximizes his or her utility. Place of residence and the distance to the private hospitals may be examples of the constraints.

In most developing countries, health care services at the private hospitals are much more expensive than the public health institutions with perceived higher level quality of care and less queuing time. Therefore, for those who seek care at the private health facilities, the need for health insurance is higher as payment for health care expenditures by the third party which is the insurance company can ease the burden of patients.

Place of residence affects the decision to purchase health insurance due to accessibility to the private hospitals. Those living in the urban area have better access to the private hospitals which are mainly located in the cities. The distance to private hospitals determines access accordingly as individuals in Malaysia have an alternative to visit public hospitals which are located across the country even in remote locations. Higher accessibility gives more opportunity for individuals to seek treatment at the private health institutions. In Liu and Chen (2002), urban/rural strata (North, Center, South, East) was found to be a significant determinant of health insurance purchase and also on the amount of health insurance coverage.

It is hypothesized that both variables will be positively related to health insurance purchase and the amount of coverage. Better accessibility means the more likely the insured individuals will utilize the health care thus will seek for a higher amount of coverage in anticipation of higher utilization.

Hypothesis 12: An individual who has higher inpatient and outpatient visit within the last one year is more likely to purchase health insurance.

Although Liu and Chen (2002) found that health care utilization was not significant in both the likelihood of purchase and the decision on the level of coverage, the prediction suggested by the Prospect theory is used to develop this hypothesis. The utilization rate may affect the individual's assignment of probabilities towards potential losses. A high inpatient and outpatient visit may indicate higher needs for medical care. Individuals who consume high medical services may expect to incur similar cost in the coming year thus more weight is assigned to the probability of losses due to medical calamities. Therefore, individuals with high inpatient and outpatient visits are more likely to purchase health insurance to cover their expected future medical care visits.

Similarly, it will affect the amount of coverage as expectation for higher utilization led to the need for a better coverage as the individuals may incur higher amount of medical expenditures.

Hypothesis 13: An individual with high out-of-pocket (OOP) cost is more likely to purchase health insurance.

If the current out-of-pocket (OOP) health expenditure is a proxy for past consumption behavior, individuals who incurred high OOP may expect to incur similar OOP health expenditure in the coming years. Thus, as predicted by the Prospect theory, individuals with high out-of-pocket cost tend to assigned more weight to potential losses due to illnesses thus are

more likely to purchase health insurance to cover their expected future medical costs.

Hypothesis 14: Health status is not a significant determinant of health insurance purchase.

As suggested by the Prospect theory, the current state of an individual and his or her evaluation of outcome with respect to gain and loss will influence future decision. As such, individuals who perceived themselves as having poor health are more likely to buy health insurance because they expect to incur high medical costs. However, the effect of health status may be the opposite as those with bad health status may not pass the insurance underwriting which in turn resulting in no insurance coverage. As evidence in Propper (1989), there was no clear relationship between health status and health insurance purchase. Thus, it is hypothesized that health status will have no significant effect on health insurance purchase.

Hypothesis 15: An individual who is risk averse is more likely to buy health insurance.

As predicted by the EU theory, individuals who are risk averse are more likely to purchase health insurance and will buy a higher amount of coverage. Pauly and Herring (2007) found that those who owned health insurance tend to be non-smokers and are not risk takers.

Therefore, it is hypothesized that an individual's attitude towards risk influences the decision to purchase health insurance. Individual who is more risk averse is more likely to purchase health insurance and will tend to purchase a higher level of coverage.

The following hypotheses are formulated in order to answer research questions number 3.

Hypothesis 16: Variable price is negatively associated with health insurance purchase.

The higher the price of health insurance product, the less likely an individual will purchase health insurance. The negative relationship between price and health insurance purchase were found in Marquis and Long (1995), Gruber and Poterba (1994) and Auerbach and Ohri (2006).

An individual confronted with the choices whether to be insured or not will balance its decision between minimizing cost and minimizing risk. The decision to purchase health insurance results in lower risk but higher cost. Thus, as the price of health insurance decreases, the individual can reduce the cost and at the same time ensuring lower risk through health insurance coverage. Therefore, it is hypothesized that the lower the price of health insurance product, the more likely an individual will purchase health insurance.

Table 3.2 summarizes the variables used in the analysis and the expected effect on the decision to purchase health insurance and the amount of health insurance coverage.

Table 3.2
Summary of Predictions

Variables	**Effect on Probability of Purchase**	**Effect on Amount of Coverage**
X_1 = income	+	+
X_2 = age	+	+
X_3 = gender	Female +	Female +
X_4= race-religion	Malay -	Malay -
X_5 = education level	+	+
X_6 = marital status	Married +	Married +
X_7= household size	-	-
X_8 = type of occupation	Service -	Service -
X_9= job sector	Public -	Public -
X_{10}= urban vs rural	Urban +	Urban +
X_{11}= distance to the private hospital	-	-
X_{12}= frequency of visit to in/outpatient	+	+
X_{13}= out-of-pocket cost	+	+
X_{14} = health status	x	x
X_{15}= attitude towards risk	Risk Averse +	Risk Averse +
X_{16} = price of hospital and surgical policy	-	NA

NA (Not Applicable); x (Not significant)

3.3 Methods

3.3.1 Data Collection

Data was extracted from the National Health and Morbidity Survey (NHMS) III. The NHMS III was conducted by the Institute of Public Health, a division under the Ministry of Health Malaysia. The NHMS III is the first data in Malaysia that combine both the health insurance ownership and the health care utilization data and it is nationally representative. The

previous NHMS studies (NHMS I and NHMS II) do not have data on health insurance ownership. The Ministry of Health conducted the survey in every 10 years.

The NHMS III data was collected in year 2006 via self-administered questionnaire and interview. The sample was selected based on Enumeration Blocks (EB). Each EB contains about 80-120 living quarters (LQ) and only 8 LQs were selected in each EB. A total of 15,519 households participated in the survey with a total of 58,538 respondents (Institute for Public Health, 2008). The questionnaire has 26 sections and there are separate questionnaires for those who are 18 years old and above, between 13 and 18 years old, and 12 and below (Individual Questionnaire). There is also another questionnaire that requires only household information (Household Questionnaire).

The findings of the different sections are reported in 26 modules and the data needed for this study are mainly in Module A – Household Information and Socio-Demography, Module B – Health Expenditure, Hospitalization, Private Health Insurance and Module D – Load of Illness, Health Utilization and Module E – Injury and Risk Reduction Practices and Module 0 – Tobacco Consumption.

The research findings were published in year 2008 and the data was made available to the public in year 2010. NHMS III reported that 18.8% of the respondents owned some type of MHI either as a stand-alone health

insurance policy and/or a rider to life insurance policy or other types of insurance related to health.

A request was made to the Director General of the Ministry of Health of Malaysia to access the raw data from the study. The approval was received in May 2010. The data set was given by The Institute of Public Health (IPH) in SPSS format and copies of the actual questionnaires and data coding reference were also provided. The IPH requires for the research to be registered with the National Medical Register (NMRR). Thus, an account is established at NMRR.

From the questionnaires, it is noted that Module B has three sections – B1: Health expenditure; B2: Hospitalization; B3: Private Health Insurance. However, questionnaires designed for those between 13 and 18 years old, and 12 and below did not have section B3. Thus, the health insurance ownership data is available for adults only. This is explained in the NHMS III report that indicates there were only 34,539 eligible respondents who answered Module B.

The question on health insurance ownership is phrased as follow: "Do you have a private health insurance purchased by yourself". If clearly understood by respondents, the answer to the questions should exclude insurance coverage offered by employer.

The next question asked about the type of health insurance owned and is phrased as follow: “What type of private health insurance is it?”. The choice are: 1) Part of life insurance scheme; 2) Medical Health Insurance Scheme; and 3) Others.

The last question asked about the amount of premium paid and is phrased as follows: “How much did you pay for the last premium per year?”. The respondent was supposed to give the amount of premium paid to the medical health insurance only and if the policy is a rider, the amount should be the actual portion of the premium paid.

The data file obtained was in four separate SPSS files. The main file contains all data from Module B and Module A and it has 55,919 cases. The variable household size and distance to the private hospital were obtained from Household Questionnaire; variable health status was taken from module D and variable risk awareness from Module E and Module 0. The data files containing the required variables were merged into the main file.

As the information on the health insurance ownership is only answered by those 18 years and above, the cases answered by those below 18 years old were deleted thus resulting in 34,393 cases. In the analysis only cases with no missing value in all variables are used. The sample size is then left with 14,223 cases.

The price variable is taken from a standard Hospital & Surgical insurance policy offered by a health insurance company that has the major market share in year 2006, the same year as the NHMS III data collection period. Based on Insurance Annual Statistic 2007 published by the Central Bank of Malaysia, the insurance company with the largest market share for MHI policy was American International Assurance (AIA). A table of benefit for a standard hospital and surgical insurance policy is obtained from AIA website. The price variable was imputed to the main data file according to gender and age.

3.3.2 Unit of Analysis

The unit of analysis is an individual who can purchase health insurance for him/herself. Some studies have used family unit (Manning *et al.*, 1987; Marquis & Long, 1995). The individual is chosen as the unit of observation because most determinants are individual characteristics (for example, age, sex, health status and hospitalization). Besides, Auerbach and Ohri (2006) used individual unit in their study.

As discussed in the previous section, the health insurance ownership data available in NHMS III is only for adults (above 18 years old) and there is no information whether the health insurance coverage was bought for individual or inclusive of family members. Further discussion on this limitation is presented in Chapter 5.

3.3.3 Measurement of Variables

Data management and analysis was performed using SPSS version 19.0 and STATA version 8.0.

3.3.3.1 Health Insurance Ownership

The health insurance ownership is a categorical variable. Code '1' indicates that the individual owns any type of health insurance coverage and '0' means that the individual does not have health insurance coverage.

Table 3.3 shows the type of health insurance purchased by the sampled individuals in this study. Eighty percent of the respondent did not own any types of health insurance while twenty (20) percent owned some types of health insurance coverage.

Table 3.3
Types of Health Insurance Policies Owned by the Sample Respondents

Types of Policy	Frequency	Percent
None	11374	80.0
Part of Life Insurance only	1307	9.2
Medical Insurance only	617	4.3
Both	925	6.5
Total	14223	100.0

3.3.3.2 Health Insurance Premium

This is a continuous variable. It is an annual payment towards health insurance premium. The value is taken from the respondents' answers in Module B.

3.3.3.3 Wealth

Wealth is an indicator of income accumulated over the course of life. As such it is a better measure of the economic status of an individual. As there is no available data on the individual's wealth, individual income was used as a proxy for wealth. Previous research also used home ownership as a proxy for wealth. However, there is no data on home ownership in NHMS III.

Previous authors used difference measures for income. Aside from family income (Liu & Chen, 2002; Propper, 1989), Propper (1989) used unearned income. The unearned income was used for measuring the cost of waiting list in getting health treatment. Kronic and Gilmer (1989) used per capita health care spending for insured ages 19-64 divided by personal income. Marquis and Long (2004) used log of poverty ratio which is family income divided by federal poverty standard. In Buchmueller and Ohri (2006), the individual income was estimated as the sample has no income data. The proxy was the zip code-level median income of household headed by adults between ages 55-64 from 2000 population census.

Preliminary analysis shows that there were huge numbers of missing data for income. Referring to the questionnaire, individuals who were studying, a housewife and unemployed were asked to skip the question on income. Thus, the missing values to these individuals where change to zero income. This step has resulted in

huge number of zero income which led to skewed income distribution. In order to solve this problem income variable was transformed using ln(1+income).

3.3.3.4 Demographic Variables

Age

This is a continuous variable. The actual age of the individual respondent was used.

Race and Religion

Preliminary analysis shows that there was high correlation between Race and Religion. The old categories of race and religion are presented in Table 3.4. A cross-tab analysis was performed and these two variables were combined into "Malay", "NonMalay Muslim" and "Others".

Table 3.4
Old Categories for Race and Religion

Race
Malays
Chinese
Indians
Other Bumis
Others

Religion
Islam
Christianity
Buddhism
Hinduism
Others

Job Sector

The job sector has been re-coded as follows: Civil Servant, Private Sector Employee, Self-employed, Housewife, Unemployed and Others. However, after deleting cases with missing values, there was no cases in the "others" category.

Types of Occupation

Following NHMS III, the types of occupation was recode and categorized as follows:

Table 3.5
Old and New Categories of Types of Occupations

Old Categories	New Categories
Senior Official & Manager	Service Sector
Professionals	Service Sector
Technicians & Associates	Non Service Sector
Clerical Workers	Service Sector
Service & Shop Workers	Service Sector
Skilled Agricultural & Fishery Workers	Non Service Sector
Craft & Related Trade Workers	Non Service Sector
Plant & Machine-operators & Assembler	Non Service Sector
Elementary Occupations	Service Sector
Housewife	Service Sector
Unemployed	Service Sector

The last category which is the "housewife and unemployed" is the same as in the job sector. In order to have a more meaningful output consistent with the theory and the previous finding, the above

categories was re-categorized as showed in the third column. The categorization is based on the estimated level of risk in each types of occupation.

Education Level

Following NHMS III, the highest education level was categorized as follows: Tertiary, Secondary, Primary and None.

Marital Status

Following NHMS III, the marital status was categorized as follows: Not married, married, divorcee, widow/widower.

Household Size

Household size is the number of people living in the same household and eating from the same pot. In some studies, family size is used instead of household size. Family size may be a more appropriate measure since insurance policy only covers immediate family members. However, household size is an indicator of an individual risk exposure as the bigger the size of a household the more likely that someone in the household may incur some health expenditure and eventually affecting the financial capacity of the individual.

Furthermore, module A has information on household size but not family size. The household members may include those who have no family ties with the head of household. The family size may be obtained by splitting the ID code and then the relation of each

respondent to the head of household is manually coded. Then the family size can be manually counted.

However, since I can only determine the relationship of each respondent to the head of household, individuals who are in a different family group but not as a head of household will not be counted. There are only 14,667 head of household in the selected cases. More cases may be lost considering of huge missing data. As such, household size was chosen.

3.3.3.5 Delivery Characteristics

Urban vs Rural

The residence of the respondents in NHMS III has been coded as urban or rural according to their locations.

Distance to the Private Hospital

The distance to the nearest private hospital was measured in kilometer (km).

3.3.3.6 Utilization

There are several measures of utilization of health care services which are number of visit to a doctor, number of hospital stay, number of prescription medicine and health expenditure. In NHMS III, there was no information on the number of stays and the number

of prescription medicine. For health expenditure, there was only information on out-of-pocket health cost. Thus, in this study, the health utilization measures used are inpatient and outpatient visits, and the out-of-pocket expenditures.

Outpatient and Inpatient Visit

In NHMS III, the respondents were asked whether they have been hospitalized for the last one month and for the last one year excluding the one month period. The answers to these two questions were the total number of hospitalization for the past one year. The respondents were also asked whether they have visited a physician for the last one month. The frequency of visits was also asked. The answers to these three questions were combined to get the total number of visit for each respondent.

Preliminary analysis shows that questions on the number of visits either to inpatient or outpatient services were preceded by a question on whether the individual has a health problem or whether he or she has any visit at all. If the answer to the preceding question is none then there will be missing values for number of visits variable. Thus, all this missing values were re-coded as zero visit.

Out-of-pocket (OOP) Cost

In NHMS III, OOP cost is defined as payments borne directly by an individual without the benefit of insurance. This includes any cost

sharing and informal payments to health care providers, pharmacies and traditional healers. The OOP cost data were asked for the outpatient visit, cost incurred for the health promotion and training and the hospitalization cost. For this study, the OOP incurred for promotion and training were not taken because this cost was not covered by private health insurance. Reimbursement received from a third party such as the employer was excluded as well.

Marquis and Long (1995) confirmed that the OOP cost was one of the key explanatory variable in the EU framework. However, as there was no direct data, family characteristics related to health care utilization such as age of the family head and the family structure were used as proxies in their study.

In NHMS III, the OOP cost data had similar missing value as the number of visits due to no incident of health problem. As such, the selected missing values were converted to zero OOP expenditure.

3.3.3.7 Reference Point

Health Status

Previous authors used several measures. Cameron *et al.* (1988) used number of chronic conditions. Marquis & Holmer (1996) used three measures of health status which were individual perception of their

health status, physical and/or role limitation measure to indicate the presence of one or more limitations due to poor health and level of psychological distress and psychological well-being from Mental Health Inventory.

In this study, the health status was measured by the existence of chronic diseases. In NHMS III, the respondents were asked whether there have any chronic diseases in the list. For this study, only two level of health status is used – good and bad. If the respondent has one or more chronic disease(s) he or she was categorized as 'bad' health status. This data was available in Module D.

3.3.3.8 Price Effect

Price

Estimating the effect of price on health insurance demand has been hampered because of the difficulty in estimating the price of health insurance and the differences in the institutional arrangement under which health insurance is purchased. The Malaysian setting provides a higher accuracy in price estimation as there is less differentiation in the health insurance market. Under group health insurance, it is easier to obtain the price of the health insurance product as it can be obtained from the employer however for individual health insurance price information is usually unavailable as the type of health

insurance product purchased and the name of health insurance companies are not reported. Thus, the price data has to be estimated.

Different authors have measured price in a variety of way. Marquis and Long (1995) imputed premium using a price list from Celtic Life Insurance Company, which specializes in offering insurance products for the individuals and small group market. The price list gave premiums data for each three digit zip code area in the United States for a standard individual health insurance product and varied according to age, sex and type of coverage. The premium was matched to the family data using geographic identifiers. The families without a premium match were excluded from the sample. A different estimate of price was employed by Marquis and Buchanan (2002) who used hypothetical insurance offer.

In group health insurance, Blumberg *et al.* (2001) used two proxies for price which were out-of-pocket premium and the total premium. The difference was made because the study involved group health insurance and part of the contribution was covered by the employer. The total premium was the price paid for the selected health insurance plan while the out-of-pocket premium was the portion of price actually paid by the employees. Similarly, Short and Taylor (1989) used employee out-of-pocket premium.

In this research, the price variable was taken from a standard Hospital & Surgical insurance policy from American International Group (AIA). As mentioned in the previous section, AIA was chosen as it has the largest market share in Malaysia in terms of medical and health insurance policy. The price was imputed based on gender and age. Similar technique was used by Marquis & Long (1992).

It is important to note that the price variable used in this study is different from premium contribution. The price variable is the premium that needs to be paid to obtain the particular health insurance coverage while the premium contribution is the actual premium paid by those who have actually bought the health insurance policy.

3.3.3.9 Uncertainty Preference

Attitude towards Risk

Two measures of attitude towards risk were used. The first was the smoking habit. An individual who was a smoker is proxy as a risk taker while a non smoker is proxy as a risk averter.

Second, the variable was measured using answers to two questions relating to behaviors in wearing a helmet and a seatbelt. The respondent was asked the following questions:

1. In the last one month how did you wear your helmet while riding motorcycle?

   The answers were: 1.“always wore it correctly”; 2.“sometimes wore it correctly”; 3. “never wore it correctly”; 4.“never wore helmet”. I combined answers to 3 and 4 and code as 3.

2. In the past month, how often do you use a seat belt when you are in the front seat of a car?

   The answers were: 1. “all the time”; 2. “Sometimes”; 3. “Never”

The variable risk attitude is estimated as listed in Table 3.6.

Table 3.6
Risk Attitude Scales for Safety Behaviors

Wearing Helmet	**Wearing Seatbelt**	**Risk Attitude**	**New Code**
1	1	1 – Risk Averse	1 – Risk Averse
1	2	2	2
2	1	2 – Moderate Risk Averse	2 – Moderate Risk Averse
1	3	3	3
3	1	3	3
2	2	3 – Risk Neutral	3 – Moderate Risk Taker
2	3	4	4
3	2	4 – Moderate Risk Taker	4 – Risk Taker
3	3	5 – Risk Taker	NA

After the above process was done, there was no case in category five. Thus, the categories of risk attitude based on the safety behavior were recorded as listed in the last column.

3.3.4 Examining the Data

From the 34,393 cases only 14,234 cases have no missing values in all variables. Descriptive analysis was performed using SPSS version 19 to determine the frequencies of various individuals' characteristics.

Further elimination of cases was done to 11 cases. A crosstab shows that 11 of the 16 cases of the maid category was non Malaysian citizen. As the maids have no individual control on the decision to purchase health insurance coverage in Malaysia, these cases were dropped resulting in only 14,223 cases.

Table 3.7
Individual respondents' relationship with head of household

	Frequency	**Percent**	**Valid Percent**
Head of household	6362	44.7	45.2
Husband / wife	3811	26.8	27.1
Child	2724	19.1	19.4
Parent	135	.9	1.0
Sibling	188	1.3	1.3
Grandchild	81	.6	.6
Grantparent	7	.0	.0
Parent-in-law	216	1.5	1.5
Brother / sister in-law	131	.9	.9
Relative	146	1.0	1.0
Friend	222	1.6	1.6
Maid	16	.1	.1
Others	22	.2	.2
Total	14061	98.8	100.0
System	173	1.2	
Total	14234	100.0	

One sample t-test and the Chi-square test were conducted to see whether there exist significant differences between the respondents in this

study and the general populations. The result is presented in Chapter 5. The population data was taken from Population and Housing Census of Malaysia conducted in year 2000 (Department of Statistic Malaysia, 2001).

3.3.5 Analyzing the Factors that Affect the Decision to Purchase Health Insurance

From the 14,223 cases, the data set was randomly divided into two groups. The first half was used to fit the model and the second set was used to measure the predictive power of the model. The random selection of the variables resulted in 7069 cases to be used to fit the model. The descriptive analysis was carried out using SPSS Version 19.

Although normality assumption is not required in logistic regression, all metric variables were tested. The variables are household size, distance to private hospitals, age, income, total out-of-pocket expenditure, number of inpatient and outpatient visits and price of individual insurance coverage. All variables violate the normality assumption except variable age and household size. Variable with positive skewness were transformed using natural logarithm (Hair, Anderson, Tatham, & Black, 1998). The summary of the results is presented in table 3.8.

Table 3.8
Descriptive statistics of the continuous variables after transformation

	N	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**	**Skewness**		**Kurtosis**	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Ln (1+Income) Monthly Income	14223	0.000	10.309	4.828	3.138	-0.809	0.021	-1.178	0.041
Ln(1+Distance)	14223	0.000	6.621	3.020	1.310	0.157	0.021	-0.515	0.041
Ln(1+Visit)	14223	0.000	3.497	0.180	0.378	2.228	0.021	5.625	0.041
Ln (1+ OOP)	14223	0.000	8.972	0.377	1.101	3.294	0.021	11.265	0.041
LnPrice	14223	5.814	9.489	6.418	0.636	1.537	0.021	2.519	0.041
LnPremium	14223	0.000	9.434	1.273	2.619	1.663	0.021	0.955	0.041

Variables with many zero observations which are total-out-of-pocket distribution and number of inpatient and outpatient visits has resulted in many missing values. As such, these two variables were transformed using ln (1 + variable). The rule of thumb is the skewness and kurtosis must be between -2 and +2. After the transformation, the assumption of normality was achieved except for the number of inpatient/outpatient visit and out-of-pocket health expenditures (OOP). Nevertheless, the transformation has resulted in better skewness and kurtosis.

Correlations between independent variables were tested. The variables which were highly correlated were Price and Age, Religion and Race and Job Sector and Income. The high correlation between variables Price and Age was expected since the price variable were imputed based on age and gender of the individuals. Thus, these two variables were included separately in the regression analysis. The variables Religion and Race were combined as explain in 3.3.3.4.

The influences of predictive variables that determine the dependent variables were analyzed using SPSS Version 19. The analysis used dichotomous dependant variable which is a discrete choice of two options representing either the respondents have health insurance or not.

3.3.6 Predicting the Likelihood of a Person Buying Health Insurance Given the Person's Characteristics

The second set of data is used to measure the predictive power of the model. The coefficients found in the first data set were plug in the second data set and the probability was counted.

3.3.7 Analyzing the Price Effect

The price elasticity of health insurance demand was measured using function

Mfx, eyex varlist(price)

The analysis was carried out using STATA software version 8.0.

3.3.8 Analyzing the Factors that Affect the Amount of Health Insurance Coverage Purchased

To estimate the factors that affect the amount of insurance coverage purchased, Heckman two-step estimator was used. The analysis was carried out using STATA software version 8.0.

3.4 Chapter Conclusion

This chapter discusses the theoretical framework that laid the foundation of this study and provides details explanation on the methods employed. Brief arguments on the selection of the logistic regression model and the Heckman two-stage model were presented then followed by the hypotheses to be tested. The hypotheses development was mainly based on the expected utility maximization theory and the empirical findings from previous

researches. The expected effect of each independent variable on the dependent variable was summarized.

In the methods section, there was detailed explanation on the data used as well as on how the variables were measured. The data was taken from National Health Morbidity Survey III (NHMS III). The measurement of variables also used previous studies as a guide except for the imputed price and the attitude towards risk. The price variable was taken from a local insurance company with the largest market share in year 2006. The price was then imputed based on age and gender assuming that the individual purchased a standard hospital and surgical insurance policy. For attitude towards risk, two measures were used, first the smoking behaviour and second, the safety behaviour. The scale for safety behaviour is a new risk attitude measure.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the analyses and provides discussion on the findings. The first section describes the descriptive statistics. In this section, the profiles of the respondents were analyzed according to those who owned health insurance and those who did not own health insurance. The exhibits answer the first research question (Objective 1).

The following section presents the output of the regression analyses. The logistic regression was performed in order to address the second research objective (Objective 2) which is to find the factors that affect the individual demand for health insurance. Several models have been used and their outputs are discussed. Once the improved model was determined, the next analysis tested the performance of the model by fitting the model using the second half of the data set (Objective 4). The effect of price on health insurance demand was carried out as a separate analysis due to the restriction in the imputation of the price variable (Objective 3).

In order to answer the fifth research question (Objective 5), the two-stage Heckman procedure and the OLS estimator were conducted. The intention is to find the factors that affect the level of health insurance purchased. The final section summarizes the results and puts forward some limitations.

4.2 Descriptive Statistics

The descriptive statistics of the samples are presented next. For the continuous variables, the descriptive statistics tabled are before the transformation. All continuous variables which are not normally distributed were transformed as explained in the Research Method chapter.

4.2.1 Summary statistic of samples

The socio-demographics of the respondents are displayed in the Table 4.1 and 4.2. The total number of respondents used in this study is 14,223.

Table 4.1
Socio-Demographics of sample

Variables	Full Sample N = 14223	
	(N)	(Percent)
Gender		
Male	7708	54.2
Female	6515	45.8
Race		
Malays	9292	65.3
Chinese	2383	16.8
Indians	1225	8.6
Other bumis	1013	7.1
Others	310	2.2
Religion		
Islam	9968	70.1
Christianity	879	6.2
Buddhism	2132	15.0
Hinduism	1039	7.3
Others	191	1.3
Education		
Tertiary	1172	8.2
Secondary	8238	57.9
Primary	3971	27.9
None	842	5.9
Marital Status		
Not married	2999	21.1
Married	10602	74.5
Divorcee	240	1.7
Widow/er	382	2.7
Types of Occupation		
Senior Officials & Managers	212	1.5
Profesionals	893	6.3
Technical & Associate	1372	9.6
Clerical Workers	849	6.0
Service & Shop Workers	2478	17.4
Skilled Agricultural & Fishery	1355	9.5
Craft & Related Trade Workers	1138	8.0
Plant & Machine Operator & Assembler	1068	7.5
Elementary Occupations	751	5.3
Housewife	3015	21.2
Unemployed	1092	7.7
Job Sector		
Civil Service	1717	12.1
Private Sector	5169	36.3
Self-Employed	3230	22.7
Housewife	3015	21.2
Unemployed	1092	7.7
Residence		
Urban	7742	54.4
Rural	6481	45.6

Table 4.1 (Continued)

Variables	Full Sample	
	(N)	(Percent)
Health Status		
No Chronic Disease	11049	77.7
Has Chronic Diseases	3174	22.3
Smoking Behavior		
Non-Smokers	10129	71.2
Smokers	4094	28.8
State		
Johor	1815	12.8
Kedah	1508	10.6
Kelantan	958	6.7
Melacca	377	2.7
N. Sembilan	549	3.9
Pahang	810	5.7
Penang	1102	7.7
Perak	1548	10.9
Perlis	207	1.5
Selangor	2170	15.3
Terengganu	769	5.4
Sabah	500	3.5
Sarawak	1178	8.3
KL	591	4.2
Labuan	141	1.0

Table 4.1 and 4.2 summarize the socio-demographics of the respondents in the sample. Fifty four percent (54.2%) were male and majority were Malays. More than 50 percent of the respondents have at least secondary education and majority were married. Almost 78 percent of the respondents were in good health and 71 percent were non smokers.

In terms of job sector, 36.3 percent worked in the private sector while 22.7 percent were self-employed. Only 12.1 percent worked as civil servants. Quite a number of the respondents were housewives. In fact, housewife accounted for the biggest proportion in terms of types of occupation, i.e., 21.2 percent. More than 50 percent of the respondents lived in the urban area with 15.3 percent coming from the Selangor state.

Table 4.2
Descriptive statistics of the continuous variables N=14223

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Monthly Individual Income	0	30000	820.919	1023.093	5.153 (.021)*	77.824 (.041)
Age Year	18	97	39.280	13.617	.441 (.021)	-.400 (.041)
Household size	1	19	4.738	2.409	1.058 (.021)	2.059 (.041)
Distance to Private Hospital	0	750	46.832	77.407	3.546 (.021)	15.886 (.041)
Number of In/ Out-Patient Visits	0	32	0.320	0.935	11.522 (.021)	280.055 (.041)
Total OOP Expenditure	0	7876	11.490	162.490	29.694 (.021)	1052.663 (.041)
Safety Behavior	1	4	1.640	.846	1.053 (.021)	-.001 (.041)
Price for Individual Insurance Coverage	335	13211	813.461	951.948	4.331 (.021)	23.258 (.041)
Actual Premium Paid in RM**	3	12500	1095.962	1193.287	3.209 (.068)	18.397 (.137)

**Standard error in parenthesis*
***For those who owned only*

In order to ensure that the sample is representative of the Malaysian population, the chi-square test and the one sample t-test was conducted to see whether there exist significant differences between the respondents in this study and the general population. Due to limitation in obtaining comparable population data, only variables of residence, race, state and household size were tested. The population data were taken from Population Distribution and Basic Demographic Characteristics (2000).

Table 4.3
Chi-Square tests for Sample Data vs Population Data

Variables	Obseved N	Expected N	Residual	Chi-square (d.f)
Residence				152.993 (1)**
Urban	3878	4382.8	-504.8	
Rural	3191	2686.2	504.8	
Race				6.430E2 (4)**
Malays	4653	3774.8	878.2	
Chinese	1177	1837.9	-660.9	
Indian	590	544.3	45.7	
Other bumis	492	827.1	-335.1	
Others	157	84.8	72.2	
State				8.524E2 (14)**
Johor	932	835.0	97.0	
Kedah	737	502.4	234.6	
Kelantan	483	396.3	86.7	
Melaka	177	191.1	-14.1	
N.Sembilan	289	261.8	27.2	
Pahang	404	389.2	14.8	
P. Pinang	549	396.3	152.7	
Perak	768	622.7	145.3	
Perlis	98	63.7	34.3	
Selangor	1063	1273.7	-210.7	
Terengganu	382	276.0	106.0	
Sabah	255	792.5	-537.5	
Sarawak	584	629.8	-45.8	
KL	279	417.5	-138.5	
Labuan	69	21.2	47.8	

***significance at p<.001*

The one-sample t-statistic shows that there was a significant difference in term of household size of the sample and the Malaysian population (t=5.090; p=.0005). The Chi-square tests also indicate that there were significant differences between the sample and the population data in term of place of residence, race and state. Detailed Chi-Square results are presented in Table 4.3. Although the result shows that there are significant differences in the sample compared to the population, this is mainly due to the fact that the sample data set is already very large. In a large data set, even a small difference in the mean will result in a significant difference in

the test. The t-test for the household size shows a mean difference of a mere 0.147. In other words, the actual difference – for any practical, real purpose - is very small. Similarly, as sample size gets larger, Chi-Square test becomes irrelevant (Wonnacott & Wonnacott, 1985).

Further, the tests of difference were carried out on selected variables only due to the limited availability of comparable data. Thus, there might be chances that other variables may show that the sample is indeed representative. In other words there might be no significant difference between the sample data and the population data in terms of other variables.

Despite these rather inconvenient results, the results from this study remain useful as this is the only available data, and it was collected by another party for other purposes. There is no other means of collecting such a large data set of this scale, except with very high cost.

4.2.2 Profiles of Policyholders and Non Policyholders

In this section, the respondents' profiles are segmented according to policyholders and non policyholders. The representations are used to address the first research objective which is "to compare the profiles of individuals with and without health insurance". As the main intention is to describe the profile only minimal discussion will be given in order to avoid redundancy as detailed discussion will be given once the model is fitted in the following section.

The mean monthly income of the respondents in the data set was RM821 (Refer to Table 4.2). The Mann-Whitney U test indicates that there was a significant difference in the mean income of the policyholders and non-policyholders ($p<.0005$) (Refer to Table A12 in Appendix A). Those who owned health insurance earned statistically significant higher mean income which was RM1556 per month compared to only RM630 per month for those who did not own health insurance (Refer to Table A1 in Appendix A).

The mean age for the sample was 39 years old (Refer to Table 4.2). The independent sample t-test shows that there was a significant difference in the mean age of the policyholders and non-policyholders ($t=9.48$; $p<.0005$) (Refer to Table A2 in Appendix A). In other words, those who did not own health insurance have statistically significant higher mean age (39.74 years) compared to those who owned health insurance (37.51 years)[1].

Table 4.4 portrays the profile of policyholders and non-policyholders according to gender. The Pearson Chi-square test was significant ($p<.0005$) (Refer to Table A3.2 in Appendix A) indicating that gender was associated with health insurance ownership. The difference between the actual and expected counts in the table suggests that female individuals were less likely to own health insurance (Expected count=5174 vs Actual count=5522)

[1] The mean difference may not be substantial and/or relevant in reality but at this stage the purpose of the analysis in just to profile the insured and the uninsured.

compared to male individuals (Expected count=1587 vs Actual count=1935).

Table 4.4
Profiles of Policyholders and non Policyholders according to Gender

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Male	Count	5773	**1935**	7708
	Expected Count	6121.2	1586.8	7708.0
Female	Count	**5522**	993	6515
	Expected Count	5173.8	1341.2	6515.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

Table A4.1 in Appendix A shows the distribution of health insurance ownership by race. The proportion of the insured was less than the uninsured across all race categories. The distribution was then segmented according to religion, as showed in Table A4.2. As there was high correlation between race and religion (Population Distribution and Basic Demographic Characteristics, 2000), the variables were combined as explained in the Research Methods Chapter.

The new categories were listed in Table 4.5 below. The Pearson Chi-Square analysis shows significant value ($p<.0005$) (Refer to Table A4.3 in Appendix A) indicating that there was a significant association between variable Race-religion and health insurance ownership. The table shows that less Muslims (both Malay and non-Malay) owned health insurance than was expected (on the assumption of independence), i.e. the actual counts were

less than the expected counts. This implies that Muslims were less likely to own health insurance compared to the non-Muslims.

Table 4.5
Profiles of policyholders and non policyholders according to religion and race

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Malay	Count	**7843**	1449	9292
	Expected Count	7379.1	1912.9	9292.0
Non Malay Muslim	Count	**604**	75	679
	Expected Count	539.2	139.8	679.0
Non Muslim	Count	2848	**1404**	4252
	Expected Count	3376.7	875.3	4252.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

According to the education attainment, 22.6 percent of individuals with secondary education owned health insurance while the ownership was more than double than expected for those with tertiary education (Refer to Table A5.1 in Appendix A). The ownership level (compared to non ownership) was substantially low for individuals without any formal education and those with only primary education with a record of 4.8 percent and 11.2 percent respectively.

Table 4.6
Profiles of policyholders and non policyholders according to education level

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Tertiary	Count	589	**583**	1172
	Expected Count	930.7	241.3	1172.0
Secondary	Count	6379	**1859**	8238
	Expected Count	6542.1	1695.9	8238.0
Primary	Count	**3525**	446	3971
	Expected Count	3153.5	817.5	3971.0
None	Count	**802**	40	842
	Expected Count	668.7	173.3	842.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

The Chi-Square test with $p<.0005$ (Refer to Table A5.2 in Appendix A) suggests that there was a significant association between education level and health insurance ownership. Further observation in Table 4.6 indicates that those who have tertiary education and secondary education were more likely to own health insurance compared to those who have primary or no formal education at all.

Table 4.7
Profiles of policyholders and non policyholders according to marital status

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Not married	Count	**2396**	603	2999
	Expected Count	2381.6	617.4	2999.0
Married	Count	8332	**2270**	10602
	Expected Count	8419.4	2182.6	10602.0
Divorcee	Count	**214**	26	240
	Expected Count	190.6	49.4	240.0
Widow/Widower	Count	**353**	29	382
	Expected Count	303.4	78.6	382.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

In terms of marital status, the Chi-square test shows that there was a significant association between marital status and health insurance ownership ($p<.0005$) (Refer to Table A6.2 in Appendix A). The higher actual count (2270) for the married individuals in Table 4.7 compared to the expected count (2182.6) suggests that married individuals were more likely to own health insurance.

The mean household size for those who owned health insurance was 4.54 compared to 4.79 for those who did not own health insurance (Refer to Table A7 in Appendix A)[2]. The t-test was significant ($t=5.144$, $p<.0005$) indicating that there was significant difference in the mean of household size between the two groups. The result suggests that the one who purchased

[2] The mean difference may not be substantial and/or relevant in reality but at this stage the purpose of the analysis in just to profile the insured and the uninsured.

health insurance tended to belong to a smaller household compared to one who did not purchase health insurance.

In terms of types of occupation, all categories show a high difference in the proportion of insured and uninsured except for the senior officials and managers, the professionals and, the technical and associates which show almost equal proportions. The detailed categories are listed in Table A8.1 in Appendix A. As explained in the Research Methods chapter, types of occupation were re-grouped into service sector and non-service sector. The Chi-square test shows a significant value ($p<.0005$) indicating that there was a significant association between the types of occupation and the health insurance ownership (Refer to Table A8.3 in Appendix A). From Table 4.8, the actual count (1359) for the individuals in the service sector exceeds the expected count (912) for those who owned health insurance. The result suggests that those working in the service sector were more likely to own health insurance compared to those who worked in the non service sector.

Table 4.8
Profiles of policyholders and non policyholders according types of occupation

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Service Sector	Count	3073	**1359**	4432
	Expected Count	3519.6	912.4	4432.0
NonService Sector	Count	**8222**	1569	9791
	Expected Count	7775.4	2015.6	9791.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

The distribution of policyholders and non policyholders according to the job category is presented in Table A9.1 in Appendix A. Among the civil servants, 42.3 percent owned health insurance. There was a high difference in the percentage of policyholders and non policyholders among the private sector employees, the self-employed, and the others (housewife and the unemployed). It appears that there was a significant association between the job sector and the health insurance ownership (Chi-Square value=1010.121; p<.0005) (Refer to Table A9.2 in Appendix A). From Table 4.9, it seems to suggest that the civil servants and the private sector employees were more likely to own health insurance as the actual count exceeded the expected count in both categories. In contrast, the others, i.e., the self-employed, housewives, and unemployed, were less likely to own health insurance.

Table 4.9
Profiles of policyholders and non policyholders according job category

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Civil Servant	Count	991	**726**	1717
	Expected Count	1363.5	353.5	1717.0
Private Sector Employee	Count	3870	**1299**	5169
	Expected Count	4104.9	1064.1	5169.0
Self-Employed	Count	**2627**	603	3230
	Expected Count	2565.1	664.9	3230.0
Housewife	Count	**2784**	231	3015
	Expected Count	2394.3	620.7	3015.0
Unemployed	Count	**1023**	69	1092
	Expected Count	867.2	224.8	1092.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

In terms of location of residence, 26.6 percent (vs. 73.4% non policyholders) of those living in urban area owned health insurance while among those who lived in the rural area only 13.4 percent (vs. 86.6% non policyholders) owned some types of health insurance (Refer to Table A10.1 in Appendix A). The Chi-square test reveals that there was a significant association between the location of residence and the health insurance ownership (p<.0005) (Refer to Table A10.2 in Appendix A). The result in Table 4.10 implies that those living in the urban area, compared to those living in the rural area, were more likely to own health insurance as the actual counts (2057) were more than the expected counts (1593.8).

Table 4.10
Profiles of policyholders and non policyholders according to location of residence

		Health Insurance Ownership		
		Do not Own	Own Health Ins	Total
Urban	Count	5685	**2057**	7742
	Expected Count	6148.2	1593.8	7742.0
Rural	Count	**5610**	871	6481
	Expected Count	5146.8	1334.2	6481.0
Total	Count	11295	2928	14223
	Expected Count	11295.0	2928.0	14223.0

The mean distance to the private hospitals was 47 km (Refer to Table 4.2). The Mann-Whitney U test (p<.0005) (Refer to table A12 in Appendix A) shows that there was a significant difference in the mean distance to private hospital for the policyholders, compared to the non policyholders. Specifically, the insured had a significantly lower mean distance to the private hospital (34.72 km) compared to the uninsured (49.97

km) (Refer to Table A11 in Appendix A). This means that the insured were closer to a private hospital compared to the uninsured.

The average number of visits to the out-patient and in-patient clinic per year was less than 1 with the highest frequency of 32 visits per year (Refer to Table 4.2). The Mann-Whitney U test indicates that there was not enough evidence to reject the null hypothesis of equal distribution in the number of in-patient and out-patient visits across categories of health insurance ownership (p=0.321) (Refer to table A12 in Appendix A). This means that there is no significant difference in the number of in-patient and out-patient visits among the policyholders and non policyholders.

The analysis also shows that each individual spent an average out-of-pocket (OOP) health expenditure of RM11.49 with the maximum OOP of RM7876 for the last one year (Refer to Table 4.2). The Mann-Whitney U test shows that there was no significant difference (p=.286) in the OOP cost for the policyholders and non-policyholders (Refer to Table A12 in Appendix A). The result suggests that there no difference in terms of OOP cost between the insured and the uninsured.

With respect to health status, the respondents who had one or more chronic diseases were grouped as having ‘bad health’ while those without any chronic disease were classified as having ‘good health’. The distribution of the insured and the uninsured between individuals with good and bad

health status did not differ much (Refer to Table A13.1 Appendix A). The Chi-square test shows insignificant value (p=.203) (Refer to Table A13.2 Appendix A) suggesting that there was no significant association between health status and health insurance ownership. This means that the insured and uninsured were not different in terms of health status.

For risk attitude, two measures were used. First was the smoking behavior. Individuals who were smokers were assumed to be risk taker while the non-smokers were assumed to be risk averse. The proportion of the insured compared to the non-insured among the smokers and the non-smokers were almost the same (Refer to Table A14.1 in Appendix A). The Chi-square test shows insignificant value (p=.203) (Refer to Table A14.2 in Appendix A) suggesting that there was no significant association between the risk attitude and the health insurance ownership. This means that the insured and uninsured were similarly represented by smokers and non-smokers. This implies that the insured were no more (or less) risk averse than the uninsured.

The second measure of risk attitude was based on a set of safety behaviors. The development of the scale was explained in the Research Methods chapter. An individual's behavior in relation to some safety issues is assumed to reflect his/his attitude towards risk. Based on this measure, 23.8 percent of risk averse individuals owned health insurance while only 7.1 percent of risk takers were insured. (Refer to Table A15.1 in Appendix

A). The percentage of those insured fell at higher risk taking behavior categories.

In the later regression model, the risk attitude measured by the set of safety behaviors was treated as an interval variable. Thus, the independent sample t-test was applied here. From table 4.2, '1' was for risk averse while '4' was for 'risk taker'. As displayed in Table A15.2 in Appendix A, the t-test shows significant value ($t=15.079$, $p<.0005$) suggesting that there was a significant difference in the level of risk attitude between the policyholders and non-policyholders. A Mann-Whitney U test was also performed. The result (Refer to Table A15 in Appendix A) confirmed the t-test indicating that the insured were more risk averse than the uninsured.

4.3 The factors that affect the decision to purchase health insurance

The data set with 14,223 cases were randomly split into sub-samples, of which 7,069[3] cases were used to fit the model to determine the factors that affect the decision to purchase health insurance. A logistic regression was applied and the first model, all variables were included based on the theoretical framework. Since there were two proxies for risk attitude, the variable smoking behavior was included first.

In this model (Model 1, Table 4.11), the significant variables were income, age, race-religion, all education categories, all job categories, out-of-pocket cost and risk attitude (smoking behavior). However, the positive

[3] The remaining cases were used to test the goodness-of-fit of the model which is explained in Section 4.5

effect of the variables Housewife and Unemployed was not as expected. As the individuals in these categories have no earned income, it is rather surprising that they were more likely to purchase health insurance.

Table 4.11
Model 1: Logistic regression

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.204****	.072	3.335
Age	**-.009***	.004	.991
Female	.032	.095	1.032
Non Malay Muslim	-.308	.199	.735
Non Muslim	**1.243****	.078	3.467
Secondary Education	**-.281***	.113	.755
Primary Education	**-.963****	.152	.382
No Education	**-1.113****	.267	.329
Married	.198	.104	1.219
Divorcee	-.355	.363	.701
Widow/widower	.156	.302	1.169
Household Size	.005	.015	1.005
Non-service sector	.018	.078	1.018
Private Sector Employee	**-.779****	.099	.459
Self-employed	**-.739****	.115	.477
Housewife	**6.019****	.508	411.109
Unemployed	**5.856****	.541	349.349
Rural	-.142	.087	.868
Distance to Private Hospital	.017	.029	1.017
Number of In/Outpatient Visits	.013	.117	1.013
OOP cost	**.072***	.036	1.075
Bad Health Status	.062	.092	1.064
Smoker	**-.331****	.087	.718
Constant	-8.555	.575	.000
N=7069			
-2LL= 5415.221			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area, has good health status and is a non-smoker.

Further analysis reveals that the above model has multicollinearity problem as indicated by high variance inflation factor (VIF) values in variables income, housewife and unemployed. The VIF values are presented in the table below.

Table 4.12
VIF for Model 1

Variable	VIF	1/VIF
Income	38.13	0.026226
Housewife	31.54	0.031707
Unemployed	14.32	0.069831
Primary education	4.63	0.215812
Secondary education	3.97	0.251752
Private sector employee	2.9	0.34429
Self-employed	2.6	0.384227
Age	2.29	0.436677
No education	2.28	0.438729
Female	2.28	0.438729
Married	1.97	0.507748
Number of In/Outpatient Visits	1.59	0.62942
Smoker	1.55	0.643827
OOP cost	1.5	0.665367
Rural	1.5	0.668071
Distance to Private Hospital	1.44	0.692112
Widow/widower	1.41	0.708001
Non-service sector	1.38	0.72663
Bad Health Status	1.2	0.836499
Divorcee	1.16	0.860194
Non Muslim	1.15	0.871551
Household size	1.06	0.940049
Non Malay Muslim	1.06	0.943317
Mean VIF	5.34	

The variables which have high VIF values were ‘housewife’ and ‘unemployed’ and ‘income’. When the model was run without job sector variables (civil servant, private sector employee, self-employed, housewife, unemployed) the VIF value becomes less than 10 and the effect of income

remained the same. However, when the variable ‘income’ was dropped from the model, the effect of ‘housewife’ and ‘unemployed’ changed from positive to negative - indicating a serious multicollineary problem.

The high correlation between ‘housewife’ and ‘unemployed’ with ‘income’ was due to the zero income earned by these two job categories. In order to solve this problem, the sample was split further into salaried and non-salaried individuals. The data set for salaried individuals contains 4997 cases and the non-salaried individuals are left with 2072 cases. Each model was then examined separately.

4.3.1 Logistic Regression for Salaried Individuals

The table below shows the logistic regression for salaried individuals (Model 2). In this model, variables income, age, non muslims, job sector and risk attitude (smoking behavior) remained significant with no change in sign. However, the out-of-pocket cost became not significant. For education, only categories ‘primary education’ and ‘no education’ were significant.

In Model 2, the VIF values for all variables were below 10 indicating no multicollinearity problem. However, the Hosmer and Lemeshow test was significant (Chi-Square = 19.428, df=8, p=0.014) which means that the null hypothesis that the model was a good fit can be rejected. Thus, the model was not a good fit model although the Cox & Snell R Square and the Nagelkerke R Square were 21.2 percent and 30.8 percent respectively.

Table 4.13
Model 2: Logistic regression for salaried individuals

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.253****	.073	3.502
Age	**-.012***	.004	.988
Female	-.041	.097	.960
Non Malay Muslim	-.289	.206	.749
Non Muslim	**1.156****	.085	3.177
Secondary Education	-.208	.116	.812
Primary Education	**-.898****	.161	.407
No Education	**-.971****	.321	.379
Married	.173	.106	1.189
Divorcee	-.322	.387	.725
Widow/widower	.260	.339	1.297
Household Size	.004	.016	1.004
Non Service Sector	.009	.078	1.009
Private Sector Employee	**-.740****	.100	.477
Self-employed	**-.704****	.115	.494
Rural	-.070	.093	.932
Distance to Private Hospital	.040	.031	1.041
Number of In/Outpatient Visits	.088	.126	1.092
OOP cost	.052	.039	1.053
Bad Health Status	.113	.099	1.119
Smoker	**-.350****	.088	.705
Constant	-8.887	.558	.000
N=4997			
-2LL= 4570.897			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area, has good health status and is a non-smoker.

In the next model, the measure of risk attitude was replaced with the safety behavior. The logistic regression result is presented below (Model 3).

Table 4.14
Model 3: Logistic regression for salaried individuals with safety behavior

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.253****	.073	3.500
Age	**-.010***	.004	.990
Female	**.210***	.089	1.234
Non Malay Muslim	-.343	.205	.710
Non Muslim	**1.174****	.085	3.234
Secondary Education	**-.241***	.115	.786
Primary Education	**-.936****	.160	.392
No Education	**-1.015***	.320	.362
Married	.153	.106	1.165
Divorcee	-.349	.386	.705
Widow/widower	.240	.340	1.271
Household Size	.004	.016	1.004
Non Service Sector	-.011	.077	.989
Private Sector Employee	**-.740****	.099	.477
Self-employed	**-.700****	.115	.497
Rural	-.095	.092	.909
Distance to Private Hospital	.058	.034	1.060
Number of In/Outpatient Visits	.094	.127	1.098
OOP cost	.054	.038	1.056
Bad Health Status	.123	.099	1.131
Safety Behaviour	**-.131****	.050	.877
Constant	-8.961	.594	.000
N=4997			
-2LL= 4580.075			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area and has good health status.

In Model 3, the significant variables remained and the 'gender' variable became significant. The measure of risk attitude using safety

behavior appears to behave as expected in which the higher the level of risk an individual is willing to accept, the less likely is the individual to buy health insurance. More importantly, the Hosmer and Lemeshow test shows insignificant value (Chi-Square = 5.659, p=.685) indicating the model was a good fit.

Cox and Snell's and Nagelkerke R^2 goodness of fit values were 0.211 and 0.307, respectively, which indicates a moderate good model fit. The value of Nagelkerke R^2 shows about 21 percent of the "variation" in the outcome variable was explained by the logistic regression model. The result of Wald test is presented in the table 4.14.

Model 3 is free from multicollinearity problem. The VIF values are presented in Table B1 in Appendix B. With this result, the subsequent model used risk attitude as measured by the safety behavior. To further improve the model, the effect of age on the probability of buying health insurance will be discussed first.

The result from Model 3 indicates that as age increases the odd of buying health insurance decreases. The negative relationship illustrated in the model was not consistent with the previous studies in health insurance demand. Marquis et. al (2006) and Auerbach and Ohri (2006) found that age was positively related to health insurance purchase. Older age is usually associated with deteriorating health status. Thus, older individuals are more likely to buy health insurance in anticipation of higher utilization of health

care services. Both researches were conducted in the US setting where private health insurance is the main financing mechanism. Individuals in the US tend to seek coverage the moment they can afford to, and the entry age is relatively very young as health insurance coverage is required to access health care. Thus, the majority of older individuals will have some kind of health insurance as they maintain their coverage from young.

In the Malaysian context however, as public health institutions are highly accessible, the need for private health insurance is perhaps not as urgently sought for as in the US. As the individuals here may only decide to seek coverage at a relatively older age, the health insurance premium may be too expensive for many. To further examine the effect of age on health insurance ownership variable Age^2 was included in Model 3 to see whether there exists a nonlinear relationship between the age variable and health insurance ownership. The results are presented as Model 4 in Table 4.15.

Table 4.15
Model 4: Logistic regression for salaried individuals with squared age

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.193****	0.073	3.298
Age	**0.143****	0.026	1.154
Age Square	**-0.002****	0.000	0.998
Female	**0.203***	0.089	1.225
Non Malay Muslim	-0.347	0.205	0.707
Non Muslim	**1.171****	0.085	3.227
Secondary Education	**-0.256***	0.116	0.774
Primary Education	**-0.871****	0.160	0.419
No Education	**-0.914****	0.322	0.401
Married	-0.117	0.114	0.89
Divorcee	-0.631	0.389	0.532
Widow/widower	-0.017	0.344	0.984
Household Size	-0.003	0.016	0.997
Non Service Sector	-0.035	0.078	0.966
Private Sector Employee	**-0.734****	0.100	0.48
Self-employed	**-0.691****	0.115	0.501
Rural	-0.093	0.093	0.912
Distance to Private Hospital	0.053	0.034	1.055
Number of In/Outpatient Visits	0.089	0.127	1.093
OOP cost	0.064	0.039	1.066
Bad Health Status	0.157	0.099	1.17
Safety Behaviour	**-0.122***	0.051	0.885
Constant	**-11.12****	0.706	0.000
N=4997			
-2LL= 4599.784			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area and has good health status.

The Age^2 variable was significant with $\beta = -0.002$. The Age variable was also significant with $\beta = 0.142$. The difference in the signs of the coefficients confirms the nonlinear relationship. The maximum value of age was 35.5 years [-0.142/2(-0.002)]. This means that the likelihood to

purchase increased up to age 35.5 years and then started to decline. Besides the high price for higher age, older individuals may be less healthy, and thus, may not meet the underwriting requirements, leading to denial of coverage from insurance companies.

Model classification performance for Model 4 was examined. The predictions were compared to the observed outcomes.

Table 4.16
Classification table for Model 4

Observed		Predicted		
		Health Insurance Ownership		
		Do not Own	Own Health Ins	Percentage Correct
Health Insurance Ownership	Do not Own	2901	770	79
	Own Health Ins	458	868	65.5
Overall Percentage				75.4

Cut of value = 0.33

Based on table 4.16, out of 1326 who owned health insurance, 868 were classified correctly while out of 3671 who did not own health insurance 2901 were in the correct group. The numbers of owners correctly classified were 75.4 percent; leading to the conclusion that the performance of this model was acceptable. The Hosmer and Lemeshow test was run and the test statistic shows a non significant value (Chi-Square=6.509; p=0.59). This means that the model was not different from the perfect model that correctly classifies respondents into owned/non-owned groups.

Based on these two model performance criteria, we can conclude that the independent variables when considered together, simultaneously influences health insurance purchase decision. To identify significant coefficients, the Wald test was applied. Adequacy of the model was assessed by using the goodness-of-fit statistics.

Cox and Snell's and Nagelkerke R^2 goodness of fit values were 0.217 and 0.316, respectively, which indicates a moderate good model fit. The value of Nagelkerke R^2 shows about 21 percent of the "variation" in the outcome variable was explained by the logistic regression model. The result of Wald test is presented in the table 4.15. The effect of the other variables on health insurance ownership was inferred from Model 4.

As expected the income variable was positively related to the health insurance ownership. Other things equal, the higher the income, the more likely an individual will buy health insurance. The finding is consistent with Propper (1989), Kronik and Gilmer (1999), Gruber and Poterba (1994) and Liu and Chen (2002). Those with high income have higher affordability and thus can allocate part of their disposable income to buy health insurance which entitles them to health care services at private healthcare institutions. The low income earners may not see health insurance as a priority in their household budget since they can access the public healthcare institutions at a minimal cost.

The finding indicates that a female individual was more likely to buy health insurance compared to a male individual. The finding is consistent with the hypothesis developed in this study. It confirms the findings in the previous studies (Auerbach & Ohri, 2006; Liu & Chen, 2002; Long & Marquis, 2002; Marquis & Long, 1995) which found that women were more likely to have health insurance coverage. The higher tendency of purchase among women is perhaps due to having higher risk aversion towards potential losses due to illnesses. Thus, they are more likely to seek health protection. Health insurance ownership can reduce anxiety as one can ensure that the needed health care can be secured and paid for in a timely manner.

The result reveals that non-Muslims were about three times more likely to purchase health insurance compared to Muslims, of whom the majority were Malays. The effect of race was found to be significant in a study by Gruber and Poterba (1994) in the US market. In the study, it was found that health insurance coverage was higher among the whites than the non-whites. Health insurance products were mainly conventionally designed, and may not be attractive to the Muslims as the products were not shariah-compliant. Although the first Islamic insurance company was established in Malaysia in the year 1984, the public awareness on the shariah-compliant products appear to have been slow in gaining acceptance, perhaps due to high resistance against conventional health insurance products. In 2006, the level of market penetration in terms of individual ordinary family (endowment, temporary, medical and health) Takaful was

only 1.13 percent[4] compared to 39.6 percent[5] of the conventional insurance products (Bank Negara Malaysia, 2009b, 2010a).

The effect of level of education on the decision to buy health insurance is as expected. The less educated individuals were less likely to buy health insurance compared to those who have tertiary level education. The result is consistent with Auerbach and Ohri (2006) and Gruber and Poterba (1994). Higher level of education is usually associated with higher level of awareness of the benefits of health insurance. Those who are highly educated can better understand the importance of health insurance and can better assess the need for health insurance. The higher cognitive ability allows them to choose among the various health insurance products in the market and purchase the suitable ones for their needs. For some individuals, especially those with lower education, aside from low awareness on health insurance benefits, the variety of health insurance products and the technicalities of the terms of health insurance policies may discourage them from buying.

The result also indicates that private sector employees and the self-employed were less likely to purchase health insurance compared to civil servants. For the self-employed, the result is as expected, but not for the private sector employees. As civil servants are entitled for almost free health care services at public health institutions, it was expected that they would be less likely to buy health insurance to access the private health care facilities.

[4] Market penetration = number of certificates (300,695) divides by total number of populations (26.6M)
[5] 10,534,525/26.6M

The finding is inconsistent with Besley *et al.* (1999). The higher likelihood of buying health insurance among the civil servants appears to reveal that civil servants may want to have better access to the private facilities.

From another perspective, civil servants could be surmised to be more risk averse in nature. Thus, they may purchase health insurance to ensure that they can get the needed health care treatment when needed, as the public health care facilities are widely perceived as having long queues. Not much can be said about the quality of health care services as this is beyond the scope of this study. Findings from Jofre-Bonet (2000) and Besley et. al (1999) revealed that individuals purchased health insurance to avoid the long queue at the public hospitals which may help explain the higher likelihood of purchasing health insurance among civil servants in Malaysia.

Another possible explanation is the potentially high incidence of insurance coverage offered by private employers to their employees. Since NHMS III only requested health insurance coverage purchased by individuals, the lower than expected health insurance ownership among private sector employees may be due to the fact that they were already covered by their employers' health insurance programs. Therefore, they were less likely to purchase health insurance directly from the market.

For the self-employed, the fluctuation in their income may discourage them from buying health insurance which requires periodic fixed

premium payments. Seeking health treatment at public health institutions is highly accessible, at minimal cost, and therefore, is probably a better alternative for this group. Nonetheless, from another perspective, the self-employed are perhaps risk takers and have greater willingness to accept uncertainty, as such they were less likely to purchase health insurance compared to the civil servants. In fact, self-employment status was used as a proxy for risk attitude whereby those who were self-employed were assumed to be risk takers in Propper (1989).

The risk attitude measured by the safety behaviour has a significant effect on the decision to purchase health insurance. The finding indicates that higher the risk an individual was willing to take, less likely would the individual be in buying health insurance. The result conforms with the proposition from theory, although Propper (1989) found that risk attitude, as measured by smoking behaviour and self-employment status, was not significant. Therefore, it is worth noting here that the risk attitude measured by the set of safety behaviours in this study appears to be a better measure of risk attitude.

4.3.2 Logistic Regression for Non-Salaried Individuals

The logistic regression for the non-salaried individuals is presented in Table 4.17 (Model 5). In this model, the 'income' variable was excluded due to high collinearity between 'income' and the 'housewife' and the 'unemployed'. This step led to VIF values of below 10 for all variables in the model. As depicted in Table 4.17, the significant factors were non

Muslims, all education categories, marital status_married and out-of-pocket (OOP) cost. The age variable, gender variable and risk attitude (safety behavior) became not significant.

Table 4.17
Model 5: Logistic regression for non-salaried individuals

Variables	Coefficient	S.E.	Odd Ratio
Age	-.006	.010	.994
Female	.026	.441	1.026
Non Malay Muslim	-.971	1.027	.379
Non Muslim	**1.684****	.213	5.388
Secondary Education	**-1.160***	.476	.314
Primary Education	**-1.640****	.515	.194
No Education	**-1.885****	.633	.152
Married	**1.010***	.501	2.745
Divorcee	-.185	1.144	.831
Widow/widower	.626	.807	1.871
Household Size	.004	.038	1.004
Housewife	.176	.427	1.193
Rural	-.421	.250	.656
Distance to Private Hospital	-.154	.084	.857
Number of In/Outpatient Visits	-.515	.349	.597
OOP cost	**.194***	.095	1.214
Bad Health Status	-.238	.256	.788
Safety Behaviour	-.190	.122	.827
Constant	**-1.898***	.858	.150
N=2072			
-2LL= 806.656			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education and is unemployed. He lives in urban area and has good health status.

Interestingly, the out-of-pocket cost affected the decision to purchase health insurance for non-salaried individuals but not for salaried individuals. In this model, the out-of-pocket (OOP) health expenditure was positively

associated with health insurance ownership. The OOP signals the expected future health care expenditure. Higher OOP cost is likely to lead to higher health care expenditure in the future. Therefore, individuals with higher OOP are more likely to purchase health insurance coverage as they are more likely to derive greater compensation from health insurance. Since the housewives and the unemployed have no income, those with higher OOP may assign more weight to the potential loss arising from health problems, which in turn influence their decision to purchase health insurance. OOP cost is significantly more important to them (non-salaried individuals) than to salaried individuals as high OOP cost may hit them more financially.

It is rather difficult to explain why the variables of age, gender and risk attitude (safety behavior) were not significant for the non-salaried individuals. One possible explanation is that the decision to buy health insurance for these individuals perhaps was made by or through another person in the family for example the spouse or parent. As such the significance of these variables was not reflected in this model.

Married individuals were more likely to be insured perhaps due to their greater exposure to risk than single individuals, as potential losses due to illness may affect one emotionally or financially even if the illness is only contracted by one's partner. The contention may well be further supported by the fact that the variable for married individual category became significant in this model. The finding shows that, among non-salaried

individuals, married individuals were almost three times more likely to purchase health insurance compared to single individuals.

The model's performance criteria and the classification table for Model 5 were performed. In summary, the Hosmer and Lemeshow test showed insignificant value (p=.764). The Cox and Snell's and Nagelkerke R^2 goodness of fit values were 0.064 and 0.176, respectively indicating a rather poor model fit.

4.3.3 Non significant Variables

The variables that are not significant on both Model 4 and 5 are household size, types of occupation, location of residence (rural vs urban), distance to private hospital and health status.

Theoretically, one would predict that household size should be positively associated with health insurance ownership, because the bigger the household size, the greater the needs for health insurance due to the presence of higher risk exposure in a larger household. As there is more members in a household, there is higher likelihood that at least one member will need health treatment. However, the finding here indicates that household size was not a significant factor in affecting the decision to purchase health insurance. This may be due to the fact that household size can also effect the decision to purchase health insurance in the opposite direction especially in the Malaysian context.

In Malaysia, household members are highly dependent on each other. Thus, in time of need, other household members can provide support, including financial assistance. As there is high mutual reliance among household members, the need for health insurance becomes less important. This argument is consistent with Jowett (2003) who found that individuals in Vietnam were less likely to purchase health insurance when they have strong social support from the community. This situation is also akin to portfolio diversification where a larger portfolio typically has lower risk, as the loss of a security is more likely to be offset by a gain in another security in a larger portfolio.

Besley *et al.* (1999) also asserted that the bigger the household size the less likely an individual would purchase health insurance coverage. However, the authors explained the finding from the perspective of income effect in which big household families usually have a lower standard of living thus they have limited available income. The available income to support the family was more needed for basic needs such as food and shelter. Since the effect of income was analyzed separately in this study, the rationale by Besley *et al.* (1999) is less applicable in this model.

In short, as the household size increases, there are likely two opposing effects. First, increased risk exposure – probability of at least one member falling sick is higher. Second, increased ability to assume this risk by self-insurance among a larger group (household). These two opposing

effects offset one another, and appear to not influence health insurance purchase.

The effect of location of residence has been inconsistent in previous studies. In this study, location of residence was used to determine access to private hospital services. As most private hospitals are located in the urban area, it was expected that those living in the urban area would be more likely to own health insurance. In Liu and Chen (2002), location of residence (North, Center, South, East) was found to be significant and the authors argued that in rural residence, those who were more likely to buy health insurance were engaged in high risk occupation. In location where the urban residence were found to be more likely to purchase health insurance, Liu and Chen (2002) claimed that it was because they were more exposed to health insurance related information. The same link cannot be established in the Malaysian context. Nevertheless, the finding in this study is consistent with Auerbach and Ohri (2006) who found that location of residence has no significant effect on the likelihood of buying health insurance.

The distance to private hospital was also included to investigate whether better accessibility to private hospitals determines the likelihood of health insurance purchase. The hypothesis that closer distance to private hospital gives higher accessibility, which in turn lead to greater likelihood of health insurance purchase was not supported as it was found that the distance to private hospital was not significant. Thus, accessibility to the

private hospitals does not influence the decision to purchase health insurance in Malaysia.

With respect to the types of occupation, it was hypothesized that the workers in the service sector are less likely to purchase health insurance. However, the effect of the types of occupation was found to be not significant in this study. The finding is inconsistent with Kronick and Gilmer (1991) who found that workers in the service sectors were less likely to have coverage than average workers. Perhaps the finding here is due to the fact that, workers in the non service sectors, which are usually associated with high occupational risk, were only offered health insurance coverage at prohibitively high premiums, or were not offered coverage at all. In other words, those in the service sector may have less need for health insurance, but they may be offered health insurance at a lower cost (due to lower occupational risk). The converse is true for those in non-service sectors. In sum, the need for health insurance is offset by the cost of health insurance in each employment sector, and thus, employment sector seems to not influence the purchase of health insurance.

The findings on the effect of health status on the likelihood of buying health insurance coverage confirms the report by Propper (1989) who reveals that health status has no influence on health insurance demand. Theoretically, as predicted by Prospect theory, an individual with bad health status or who expects that he or she will have a deteriorating health state will be more likely to buy health insurance to ensure the health expenditures

would be covered. An individual who is in good health inclines to view the premium payment towards health insurance policy as a loss relative to the current state (reference point). Thus, the individual tends to be risk seeking and will not purchase health insurance.

Nonetheless, the non ownership among the individuals with bad health status may also be due to the fact that they are unable to obtain health insurance coverage at a reasonable price. The health status measure used in this study was existence of chronic diseases. As this study was cross-sectional, it reflected the actual health state. These individuals did not have health insurance coverage probably due to failure to pass the underwriting requirements imposed by the insurance company. In short, those with poor health have greater need for health insurance, but also have less or no access to health insurance (due to insurance companies' reluctance to cover them). In contrast, those with good health have less need for the insurance but have greater access to the insurance. Again, as the need for insurance is offset by the access to insurance for a particular health status, and thus health status does not seem to affect health insurance purchase.

4.4 The Effect of Price on the Demand for Health Insurance

Price elasticity is a measure of the responsiveness in demand towards the change in price. As the price of the health insurance product was imputed based on the hospital and surgical insurance policy which is a type of medical insurance, including those individuals who purchased health insurance coverage as part of their life insurance policies would be

misleading. In order to accurately measure the effect of price on the decision to purchase health insurance, cases were coded "1" if they purchased medical insurance only or if they purchased medical insurance as well as health insurance coverage as a rider in a life insurance policy. Those who bought health insurance coverage as part of life insurance policy were excluded resulting in 12,916 cases. With this exclusion, the actual percentage of individuals who purchased health insurance coverage used in the analysis was 11.9 percent only.

Table 4.18 shows the types of health insurance purchased by the sample respondents and the percentage of those who were considered as having health insurance for the purpose of this analysis. For the analysis of the elasticity of price, individuals who owned health insurance policies which were part of life insurance policy only were excluded from the analysis[6]. The effect of price on the decision to buy health insurance was analysed separately for the salaried and non salaried individuals.

Table 4.18
Health Insurance Ownership and Types of Health Insurance Purchased

	Frequency	Percent
Types of Health Insurance Purchased		
None	11374	80.0
Part of Life Insurance only	1307	9.2
Medical Insurance only	617	4.3
Both	925	6.5
Total	14223	100.0
Health Insurance Ownership		
Do not Own	11374	88.1
Own	1542	11.9
Total	12916	100.0

[6] Logistic Regression was also conducted assuming that those who purchased health insurance coverage as part of life insurance policies as non buyers. The findings as presented in Table B2 in Appendix B are similar to Model 6.

Table 4.19 presents the logistic regression for salaried individual with price variable included while the age variable was excluded. This is due to the fact that the price variable was imputed based on age and gender. Inclusion of age variable would result in multicollinearity problem.

Table 4.19
Model 6: Logistic Regression for Salaried Individuals and Price

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.355****	.091	3.878
Female	**.395****	.112	1.485
Non Malay Muslim	-.436	.287	.647
Non Muslim	**1.276****	.105	3.582
Secondary Education	-.269	.139	.764
Primary Education	**-.822****	.197	.439
No Education	**-.841***	.418	.431
Married	.114	.124	1.120
Divorcee	-.542	.553	.582
Widow/widower	.064	.457	1.066
Household Size	-.006	.020	.994
Non Service Sector	-.046	.098	.955
Private Sector Employee	**-.758****	.126	.469
Self-employed	**-.569****	.145	.566
Rural	-.169	.120	.845
Distance to Private Hospital	.040	.043	1.040
Number of In/Outpatient Visits	.179	.159	1.196
OOP cost	.041	.048	1.042
Bad Health Status	.113	.127	1.120
Safety Behaviour	**-.147***	.066	.863
Price of Insurance	**-.355****	.128	.701
Constant	**-8.476****	1.021	.000
N=4404			
-2LL= 3018.388			

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area and has good health status.

The result in Model 6 indicates that as the price of health insurance increases the likelihood of buying health insurance decreases. The negative relationship corroborates theory and previous literature (Auerbach & Ohri, 2006; Gruber & Poterba, 1994; Heim & Lurie, 2009; Marquis & Long, 1995). As predicted by the EU theory, higher price will result in lower initial wealth for the individuals. Thus, if the individuals have to pay higher prices to be insured, it should result in a lower state of utility than being uninsured. As a utility maximizer, the individual will be less likely to purchase health insurance when the price is high.

The result shows a price elasticity of -0.3167 which suggests that a 10 percent decrease in the price of health insurance would result in a 3.17% increase in the likelihood of buying health insurance.

Elasticities after logit
y = Pr(ownership) (predict)
= .09425819

Variable	ey/ex	Std Error	z	P>|z|	[95% C.I.]	X
Price	-.3166	.1006	-3.15	0.002	-.5139 -.1194	706.026

It is very interesting to note that the price elasticity found in this study is very similar to the previous researches conducted in a different market setting. In comparison, price elasticity found in Marquis and Long (1995) were between -0.3 to -0.4 while Auerbach and Ohri (2006) recorded price elasticity of -0.59. Lower price elasticity was found in an employer-sponsored health insurance (ESI) study (Blumberg et. al, 1999). The price elasticity became higher when the unit of analysis was an individual instead

of a family unit. In ESI, workers were less responsive to the change in price perhaps due to premium contribution from the employer while for family, having health insurance coverage is an important health protection for the family members thus it is imperative to maintain coverage regardless of price change.

It is rather surprising to find that the demand for health insurance in Malaysia is price inelastic[7]. Despite the availability of public health services which means high substitution effect, the individuals in Malaysia appeared to be relatively unresponsive to the change in price. In economic theory, the law of demand states that goods with many substitutes, or those considered as luxury goods, usually have high price elasticity. Studies by Blumberg et.al (2001) and Auerbach and Ohri (2006) were carried out in the US setting where private health insurance was the major health care financing mechanism. Individuals without private health insurance in the US have no alternative except for the very poor who are eligible for Medicaid, and the Medicare for the elderly. It is expected that individuals in the US were rather less responsive to price change as there was no close substite for health insurance coverage.

Although the finding reveals that price plays a role in the decision to purchase health insurance, in the Malaysian market, lowering the price of health insurance products would have a less than corresponding impact on the take-up rate as indicated by the relatively low price elasticity.

[7] If price elasticity is more than 1, it is price elastic. If it is less than 1, it is price inelastic.

The effect of price for non-salaried individuals was also analyzed. The price variable was found to be not significant (p=.813). The result is presented in Table B3 in Appendix B. The result indicates that price was not a factor in the likelihood of health insurance buying for the housewife and the unemployed probably due to the fact that they were not responsible for the payment of health insurance premium[8]. However, taken together, there is a negative impact of price on salaried individuals' demand for health insurance, but there is no price impact on non-salaried individuals' demand for health insurance. To recap, the impact of health insurance price on health insurance demand is non-existent for non-salaried individuals, but negative for salaried individuals, although it is less than proportionate.

4.5 The likelihood of a person buying health insurance, given the person's characteristics

In order to develop a parsimonious and robust model for prediction, the variables which were insignificant were re-grouped or eliminated. The reduced form models for the salaried and non salaried individuals are presented next.

4.5.1 Reduced Form Model for Salaried Individuals

Table 4.20 shows the reduced form model for the salaried individuals (Model 7). The Hosmer Lemeshow test (Chi-square=7.506, df=8, p=.483) and the goodness-of-fit tests (Cox & Snell R^2=.214, Nagelkerke R^2=.312)

[8] The inclusion of price variable changed the effect of the marital status and location of residency on health insurance ownership. These changes are not directly comparable with Model 5 as the dataset and the independent variables were different. Moreover, the main motive of this section is mainly to analyze the effect of price only.

indicate that the model is a good fit. The classification table for Model 7 is presented in Table 4.21.

Table 4.20
Model 7: Reduced form Logistic regression for salaried individuals

Variables	Coefficient	S.E.	Odd Ratio
Income	**1.192****	.071	3.293
Age	**.127****	.023	1.136
Age Square	**-.002****	.000	.998
Female	**.214***	.085	1.238
Non Muslim	**1.198****	.083	3.315
Secondary Education	**-.272***	.114	.762
Up to Primary Education	**-.903****	.155	.405
Private Sector Employee	**-.732****	.098	.481
Self-employed	**-.690****	.113	.502
Safety Behaviour	**-.118***	.050	.889
Constant	**-10.780****	.644	.000
N=4997			
-2LL= 4580.523			

**significant at p<.05, **significant at p<.01*

Base category: A male individual who has tertiary education and works as a civil servant.

Table 4.21
Classification table for Model 7

Observed		Predicted		
		Health Insurance Ownership		Percentage Correct
		Do not Own	Own Health Ins	
Health Insurance Ownership	Do not Own	2908	763	79.2
	Own Health Ins	459	867	65.4
Overall Percentage				75.5

Cut off Value =0.33

The predictive power of the model was tested using the second half of the data set. The data was computed using SPSS. The computation was based on the formula below:

$$y = -10.78 + 1.192\text{Income} + .127\text{Age} - 0.002\text{Age}^2 + 0.214\text{Female} + 1.198\text{NonMuslims} - .272\text{Secondary} - 0.903\text{Up to Primary} - 0.732\text{Private sector employees} - 0.690\text{Self-employed} - 0.118\text{Safety Behavior}$$

$$\text{Probability} = 1 / (1 + e^{-y})$$

For the purpose of classification, the default cut off value in statistical software is 0.5[9]. In this analysis, the cut point was changed to 0.33 to improve the percentage of correct classification for both the insured and the uninsured. The cases with the probability values of greater than or equal to 0.33 were considered as having purchased health insurance and the value of '1' was assigned. Otherwise, the value of '0' was assigned to the case. Then, a crosstab analysis was carried out between the actual health insurance ownership and the predicted health insurance purchase computed using the above formula. The result is presented in Table 4.22.

[9] Changing the cut-off value will change the sensitivity and the specificity of the model. A lower cut-off value will result in higher sensitivity but lower specificity. Here, a lower cut-off value will result in a higher number of cases to be classified as purchasers than non purchasers. A lower cut point is appropriate as the percentage of those who owned health insurance is low.

Table 4.22
Cross tabulation health insurance ownership and predicted purchase for Salaried Individuals

			Predicted Purchase		
			Do not Own	Own Health Ins	Total
Actual Health Insurance Ownership	Do not Own	Actual Count	3616	832	4448
		Expected Count	3396.6	1051.4	4448.0
	Own Health Ins	Actual Count	293	378	671
		Expected Count	512.4	158.6	671.0
Total			3909	1210	5119

As in Table 4.23, the Chi-Square test shows that there is a significant association between the predicted purchase of health insurance and the actual purchase of health insurance (ownership). The cross-tab table indicates that 3616 individuals were correctly predicted as did not own health insurance while 378 individuals who owned health insurance were correctly classified as owned. The percentages of correct classifications are 78.9 percent for individuals who did not own and 65 percent for individuals who own health insurance.

Table 4.23
Chi-Square Test for actual vs predicted purchase for salaried individuals

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	457.364	1	.000		
Continuity Correction	455.282	1	.000		
Likelihood Ratio	392.253	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	457.275	1	.000		
N of Valid Cases	5119				

In short, the cross-tab table shows that the prediction based on the model (actual count) was significantly better than the prediction would have been based on the assumption of independence (expected count). In other words, the actual count of correct predictions based on the model was higher than the expected number of correct predictions based on the assumption of independence. The number of cases that were correctly predicted to not purchase health insurance using the model (actual count, 3616) was higher than expected (expected count, 3396). Similarly, the number correctly predicted to purchase health insurance using the model (actual count, 378) was higher the expected count (158). Thus, this model is useful for predicting the potential insurance buyer among salaried individuals.

Likewise, the actual count of incorrect predictions based on the model was lower than the expected number of incorrect predictions based on independence assumption. Note that the number of cases that were wrongly predicted to purchase health insurance based on the model (actual count, 832) was lower than expected based on the assumption of independence (expected count, 1051). Similarly, the number of cases wrongly predicted to not purchase based on the model (actual count, 293) was lower the expected count (512).

4.5.2 Reduced Form Model for Non Salaried Individuals

The table below shows the reduced form model for the non salaried individuals. The variables which were significant at α=10% were included

in the reduced form model[10]. The performance criteria for Model 8 are very weak. The Cox and Snell's and Nagelkerke R^2 goodness of fit values were 0.060 and 0.164, respectively. While the cut off value in the classification table needed to be adjusted to 0.14 in order to get a reasonable prediction of the health insurance owners (Refer to Table B4 in Appendix B).

Table 4.24
Model 8: Reduced form model for non salaried individuals

Variables	Coefficient	S.E.	Odd Ratio
Non Muslim	**1.716****	.209	5.563
Secondary Education	**-1.138****	.468	.321
Up to Primary Education	**-1.818****	.491	.162
Married	**.774***	.357	2.167
Divorcee/ Widow/widower	-.049	.628	.953
Rural	**-.526***	.243	.591
Distance to Private Hospital	-.113	.087	.893
OOP cost	.092	.072	1.096
Constant	**-2.347****	.510	.096
N=2072			
-2LL= 816.362			

**significant at p<.05, **significant at p<.01*

Base category: A single Muslim who has tertiary education and lives in an urban area.

Table 4.25
Classification table for Model 8

Observed		Predicted		
		Health Insurance Ownership		
		Do not Own	Own Health Ins	Percentage Correct
Health Insurance Ownership	Do not Own	1767	180	90.8
	Own Health Ins	79	46	36.8
Overall Percentage				87.5

[10] Variable location of residence (rural/urban) became significant

Cut off value 0.14

Although the model fit is rather poor, the predictive power of the model was still tested using the second half of the data set. The computation was based on the formula below:

y = -2.347 + 1.716NonMuslims -1.138Secondary – 1.818Up to Primary + 0.774Married – 0.049Marital-Others – 0.526Rural – 0.113Distance to Private Hospital + 0.092OOP Cost

$$\text{Probability} = 1 / (1 + e^{-y})$$

Cases with the probability above the cut off value, which was 0.14, were considered as purchased health insurance and the value of '1' was assigned. Otherwise, the value of '0' was assigned to the case. Then, a crosstab analysis was carried out between the actual health insurance ownership and the predicted purchase value as computed using the above formula. The result is presented below.

Table 4.26
Cross Tabulation Actual Health Insurance Ownership and Predicted Ownership for Non Salaried Individuals

			Predicted Ownership		Total
			Do not Own	Own Health Ins	
Health Insurance Ownership	Do not Own	Actual Count	876	984	1860
		Expected Count	834.5	1025.5	1860.0
	Own Health Ins	Actual Count	37	138	175
		Expected Count	78.5	96.5	175.0
Total			913	1122	2035

Table 4.27
Chi-Square Tests for Actual vs Predicted Ownership for Non salaried Individuals

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	43.557	1	.000		
Continuity Correction	42.514	1	.000		
Likelihood Ratio	46.828	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	43.536	1	.000		
N of Valid Cases	2035				

For the non salaried individuals, the Chi-Square test also shows that there was a significant association between the actual ownership and the predicted ownership. Table 4.25 shows that 1767 individuals were correctly classified as non policyholders and 46 individuals were correctly classified as policyholders. The higher actual count compared to the expected for the uninsured (876 vs. 834.5) and insured (138 vs 96.5) suggests that the prediction based on the model was significantly better than the prediction would have been based on the assumption of independence.

4.6 The factors that affect the amount of insurance coverage

The factors that affect the amount of health insurance coverage bought by individuals were first analyzed using the Heckman two-stage estimation. In this analysis, the decision on the amount of health insurance coverage is assumed to be made simultaneously with the decision to buy health insurance. As explained in the Research Method Chapter, Heckman two-stage estimation involved probit analysis in the first stage and the OLS estimator in the second stage. The dependent variable in the outcome

equation (second stage) is the premium and the dependent variable in the selection equation (first stage) is the decision whether to own or not to own health insurance. All independent variables appear in both equations as I could not find any variable that could plausibly satisfy the exclusion restriction.

Table 4.28 shows the result from the Heckman two-stage estimation for the salaried individuals. The factors affecting the decision to own health insurance which is estimated using probit model produce very similar results as in the logistic regression analysis. In other words, the factors affecting decision to own health insurance are individual income, age, age-square, gender, non Muslim, all education categories, job sector (private sector employee, self-employed) and risk attitude (safety behavior).

However, the inverse Mill's ratio was insignificant (α=-.49) indicating the prediction that the amount of health insurance coverage bought is dependent on the decision to own health insurance is not proven. Further, it suggests that the selection bias is not very important for this specific analysis. In other words our estimates are unaffected by the sample selection.

Table 4.28
Heckman Selection Model – Two Step Estimate

	Decision to Own				**Amount of Coverage**			
Variables	Coef.	Std. Err.	[95% Conf.	Interval]	Coef.	Std. Err.	[95% Conf.	Interval]
Income	**0.6614****	0.0411	0.5809	0.7419	0.3528	0.2663	-0.1692	0.8747
Age	**0.0858****	0.0149	0.0567	0.1150	0.0175	0.0441	-0.0689	0.1039
Age Square	**-0.0011****	0.0002	-0.0015	-0.0008	-0.0002	0.0006	-0.0014	0.0009
Female	**0.1049***	0.0520	0.0031	0.2068	0.1492	0.0899	-0.0270	0.3254
Non Malay Muslim	-0.2045	0.1157	-0.4312	0.0223	0.2069	0.2216	-0.2274	0.6412
Non Muslim	**0.7030****	0.0497	0.6055	0.8005	**0.5899***	0.2827	0.0358	1.1441
Secondary Education	**-0.1858****	0.0697	-0.3225	-0.0492	-0.0691	0.1078	-0.2803	0.1421
Primary Education	**-0.5373****	0.0941	-0.7218	-0.3529	-0.0364	0.2400	-0.5069	0.4340
No Education	**-0.5703****	0.1771	-0.9175	-0.2232	0.4405	0.4103	-0.3637	1.2446
Married	-0.0729	0.0674	-0.2049	0.0592	-0.0667	0.1092	-0.2807	0.1473
Divorcee	-0.3855	0.2252	-0.8269	0.0559	**-0.9033***	0.4169	-1.7203	-0.0863
Widow/widower	0.0344	0.1919	-0.3416	0.4105	-0.2249	0.3327	-0.8769	0.4272
Household Size	-0.0031	0.0094	-0.0215	0.0153	-0.0194	0.0153	-0.0493	0.0105
Non Service Sector	-0.0210	0.0456	-0.1104	0.0683	0.0661	0.0722	-0.0755	0.2076
Private Sector Employee	**-0.4417****	0.0592	-0.5578	-0.3256	0.3278	0.1986	-0.0614	0.7170
Self-employed	**-0.4037****	0.0677	-0.5364	-0.2710	0.3659	0.2020	-0.0300	0.7618
Rural	-0.0500	0.0537	-0.1553	0.0553	-0.0531	0.0882	-0.2259	0.1198
Distance to Private Hospital	0.0322	0.0197	-0.0064	0.0707	-0.0322	0.0329	-0.0966	0.0322
Number of In/Outpatient Visits	0.0551	0.0743	-0.0906	0.2009	0.0366	0.1163	-0.1913	0.2645
OOP cost	0.0353	0.0229	-0.0095	0.0801	0.0324	0.0358	-0.0378	0.1026
Bad Health Status	0.0836	0.0583	-0.0306	0.1978	-0.0079	0.0936	-0.1914	0.1756
Safety Behaviour	**-0.0661***	0.0289	-0.1227	-0.0094	-0.0627	0.0561	-0.1727	0.0474
Constant	**-6.2952****	0.4015	-7.0822	-5.5083	3.6079	3.0339	-2.3385	9.5542

**significant at p<.05, **significant at p<.01*

Therefore, the factors that affect the amount of health insurance is then analyzed using OLS estimator. This step is consistent as exercised in Liu and Chen (2002). Table 4.29 shows the result of the OLS estimation. The significant variables are the income level, gender, race-religion (non Muslims), marital status (divorcee) and job sector (private sector employees and self-employed). In brief, individuals with higher income are more likely to purchase a more comprehensive coverage. Being a female, a non Muslim or a divorcee may also influence the amount of health insurance coverage bought. In addition, the fact that the individuals works in the private sectors or are self-employed may have an effect on the comprehensiveness of the insurance coverage taken.

The results reveal that the variables affecting the amount of health insurance coverage purchased differ from those affecting the decision to buy health insurance. Variables income, gender (female), non Muslims, job sector (private sector employee, self-employed), were significant in both the decision to own and the amount of coverage purchased while variables age, age square, education and risk attitude were significant only in the decision to buy health insurance. Interestingly, variable marital status (divorcee) was significant only in the level of coverage equation.

Table 4.29
Linear Regression for Factors Affecting Amount of Coverage for Salaried Individuals

Variables	Coef.	Std. Err.	[95% Conf.	Interval]
Income	**0.4792****	0.0627	0.3562	0.6023
Age	0.0344	0.0274	-0.0194	0.0883
Age Square	-0.0005	0.0003	-0.0011	0.0002
Female	**0.1682***	0.0812	0.0089	0.3275
Non Malay Muslim	0.1687	0.2082	-0.2399	0.5772
Non Muslim	**0.7228****	0.0777	0.5703	0.8753
Secondary Education	-0.0962	0.0924	-0.2774	0.0851
Primary Education	-0.1298	0.1457	-0.4156	0.1560
No Education	0.3300	0.3448	-0.3464	1.0065
Married	-0.0794	0.1063	-0.2878	0.1291
Divorcee	**-0.9696***	0.3957	-1.7458	-0.1933
Widow/widower	-0.2221	0.3339	-0.8772	0.4330
Household Size	-0.0200	0.0152	-0.0499	0.0098
Non Service Sector	0.0610	0.0716	-0.0795	0.2015
Private Sector Employee	**0.2406****	0.0875	0.0690	0.4123
Self-employed	**0.2820****	0.1068	0.0726	0.4915
Rural	-0.0642	0.0854	-0.2317	0.1033
Distance to Private Hospital	-0.0261	0.0305	-0.0860	0.0337
Number of In/Outpatient Visits	0.0455	0.1150	-0.1802	0.2712
OOP cost	0.0392	0.0330	-0.0255	0.1040
Bad Health Status	0.0080	0.0879	-0.1645	0.1805
Safety Behaviour	-0.0760	0.0493	-0.1726	0.0207
Constant	**2.1604****	0.6590	0.8676	3.4532
N = 1283				
R^2=0.1834				
Adjusted R^2=0.1691				

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education, works in service sector and is a civil servant. He lives in urban area, has good health status and is a non-smoker.

Income was found to be positively associated with the amount of health insurance coverage purchased and on the decision to buy health insurance. This finding is consistent with findings in Liu and Chen (2002). The higher the individual income, the higher the purchasing power thus the individual can afford to buy health insurance with a larger amount of coverage. Individual income may reflect the individual's reference state, as implied in Prospect theory. Other things equal, the higher the income, the lower the effect of premium payment in reducing the current state. Thus, buying health insurance is viewed as a gain alternative for high income individuals, and this, in turn, makes them risk averse.

Female individuals were found to purchase a higher amount of health insurance coverage and were more likely to purchase health insurance. As hypothesized, female individuals were probably more risk averse than male individuals thus they were more likely to seek health insurance coverage and ensure adequate protection by purchasing a more extensive coverage (Barringer & Mitchell, 1994; Liu & Chen, 2002; Sturman *et al.*, 1996).

Further, the result shows that individuals who are non Muslims also purchased higher level of health insurance coverage. The influence of social norms exerted by Theory of Planned Behavior and as reflected by religious belief was significant in determining the extent of coverage sought. The Central Bank of Malaysia reported that in 2006, the gross direct premium for medical health insurance was RM1089 million compared to

RM122.6 million contribution of new business by medical and health takaful (Bank Negara Malaysia, 2007). Although the Muslims may have purchased conventional insurance as well, the substantial difference between the gross direct premium of medical and health insurance and contribution for medical and health takaful may explain the higher level of insurance coverage among the non Muslims. In addition, studies in life insurance also indicated that the demand is less in predominantly Muslim countries (Browne & Kim, 1993).

In addition, job sector was found to be significant in both equations although the signs of the relationships were mixed. In the decision to own health insurance, both the private employees and the self-employed were less likely to purchase health insurance compared to the civil servants. In the OLS regression, the private employees and the self-employed were positively associated with the amount of coverage purchased. The private employees were less likely to purchased health insurance compared to the civil servants but tend to purchase a higher amount of health insurance coverage. In section 4.3.1 it was argued that the self-employed are perhaps risk takers thus they were less likely to own health insurance. Being risk takers, it should be expected that the self-employed would seek for a lower amount of coverage. The opposite finding may suggest the extent of benefits offered in the insurance policy is of importance to the self-employed thus they bought higher level of coverage.

For private employees, it was argued in section 4.3.1 that they may be covered by employer-sponsored health insurance which explains the less likelihood of purchase among the private employees compared to the civil servants. As the result shows that the private employees tend to purchase a higher level of insurance coverage, it may be because they preferred better access to the private health institutions or perhaps they have higher average earnings than the civil servants which allow them to afford a more comprehensive cover.

The effect of variable divorcee on the amount of coverage purchased is rather surprising as none of the other marital status categories were significant. In Liu and Chen (2002), married individuals were found to purchase a higher level of health insurance coverage compared to single individuals. In this study, no inference can be made about the married individuals as the variable is found to be not significant. Perhaps the individuals who are divorced are less risk averse with regard to financial risk due to medical calamities as the chances of illnesses have no apparent impact to the spouses. Thus, divorcee tends to purchase a less comprehensive coverage.

It is of further interest to understand the effect of age, education and risk attitude on decision to buy but not on the amount of coverage. Liu and Chen (2002) found that age has no significant effect on the level of coverage but education is positively associated with the level of coverage. The price of insurance policy is dependent on age as well as the extensiveness of

coverage. However, one can choose a lower level of coverage according to one's ability to pay. As such, age affects the decision to buy but not the level of coverage. In the Malaysian context, education reflects the level of awareness of the importance of health insurance which explains the higher likelihood of purchase. However, buying of a more extensive coverage may be hindered by other factors such as cost constraints. In other words, the greater awareness on the need for a higher cover from a higher education level may be inadequate in effecting the decision to purchase a higher insurance cover. Similar argument can be applied to the effect of risk attitude. The more risk averse individuals may want more to have some health insurance cover, but not necessarily, more health insurance cover.

For the non-salaried individuals, the result from the Heckman two-stage estimator is presented in Table B5 in Appendix B. The inverse Mill's ratio is also not significant suggesting that our estimates are unaffected by the sample selection. OLS estimator is then carried out on those who purchased insurance only. From the 2072 cases of non salaried individuals, only 121 cases were individuals who purchased health insurance. The result is presented in Table 4.30.

The analysis shows that only two variables affected the level of insurance coverage – being a non Muslim and have primary education. Specifically, individuals who are non Muslims tended to have a higher amount of insurance coverage while individuals with primary education tended to purchase a less comprehensive coverage.

Table 4.30
Linear Regression for Factors Affecting Amount of Coverage for Non Salaried Individuals

Variables	Coef.	Std. Err.	[95% Conf.	Interval]
Age	0.0299	0.0130	0.0041	0.0558
Female	0.2894	0.5120	-0.7262	1.3050
Non Malay Muslim	0.1522	1.1377	-2.1043	2.4088
Non Muslim	**0.7284****	0.2526	0.2273	1.2295
Secondary Education	-0.7625	0.4861	-1.7267	0.2017
Primary Education	**-1.3189***	0.5440	-2.3979	-0.2400
No Education	-0.9931	0.6996	-2.3807	0.3944
Married	0.9511	0.5688	-0.1771	2.0794
Divorcee	0.1399	1.4473	-2.7308	3.0106
Widow/widower	0.9077	0.8716	-0.8211	2.6364
Household size	0.0381	0.0430	-0.0471	0.1233
Housewife	0.4150	0.4566	-0.4906	1.3205
Rural	-0.0250	0.3039	-0.6277	0.5777
Distance to Private Hospital	-0.1468	0.1002	-0.3456	0.0521
Number of In/Outpatient Visits	0.3071	0.4034	-0.4931	1.1073
OOP cost	-0.0660	0.0916	-0.2477	0.1156
Bad Health Status	-0.1044	0.2906	-0.6809	0.4721
Safety Behavior	0.1031	0.1559	-0.2062	0.4124
Constant	4.5327	0.9172	2.7135	6.3520
N = 121				
R^2=0.2671				
Adjusted R^2=0.1378				

**significant at p<.05, **significant at p<.01*

Base category: A single Malay male, has tertiary education and is unemployed. He lives in urban area and has good health status.

In summary, for the non salaried individuals, the findings from both the logit model and the OLS estimator indicate that individuals who were non Muslim were more likely to purchase health insurance and also tended to have a more comprehensive coverage. Similar argument for the salaried individuals can be applied to the non salaried individuals. In addition, the level of education affects both the decision to own and the level of coverage. Those who were less educated were less likely to own health

insurance while those who had only primary education owned a less comprehensive insurance coverage. Level of education reflects the level of awareness as well as the cognitive ability to understand the needs and also the importance of adequate coverage. As evidenced in Hanoch and Rice (2006), elderly individuals faced decision conflicts when given too many choices of health insurance options due to their limited cognitive ability. Similarly, less educated individuals may be discouraged by the technicalities of health insurance policy terms and conditions or perhaps may not have managed to understand the protection mechanism provided by health insurance thus resulting in taking a less comprehensive coverage.

Two other variables which are the out-of-pocket cost and married individual only affected the decision to purchase but not the level of coverage. An individual with higher OOP health expenditures was more likely to purchase but the OOP cost has no influence on the level of coverage purchased. As predicted by Prospect theory, an individual with higher OOP cost may assign a higher probability on the potential loss due to medical calamities leading to the purchase of health insurance. However, the overweighting of the potential loss seems to only trigger the decision to own arising in higher utility to the individual. The decision to take on a higher amount of coverage does not appear to increase the individual's utility any further. Therefore, the OOP cost did not influence the level of coverage. Likewise, a married individual is more likely to be insured as the well being of one partner may affect the other. However, the level of

coverage seems to have no additional utility for the non-salaried married individual.

4.7 Chapter Conclusion

In this chapter, thorough analyses were conducted to address all the research objectives that were proposed in the first chapter. In the first section, the profile of the policyholders and the non policyholders were compared. The results showed that the two groups significantly differed in terms of income, age, gender, religion, marital status, types of occupation, job sector, location of residence, the mean distance of residence to private hospitals, the average number of visits to the out-patient and in-patient clinics in the last one year and the risk attitude. Specifically, the insured, compared to the uninsured, earned higher income, were older, non Muslim male, married, worked in the service sector, lived in the urban area and nearer to a private hospital, visited clinics more often and were more risk averse.

Then the regression models were generated. As there was high correlation between the 'housewife' and 'unemployed' categories with income variable, the data set was split into the salaried individuals and non salaried individuals. Separate regression models were analyzed.

The findings demonstrate that the significant determinants of health insurance purchase for the salaried individuals were income, age, gender, religion, education level, job sector and risk attitude as measured by safety

behavior. For the non salaried individuals, the significant factors were religion, education level, marital status and out-of-pocket (OOP) health expenditure.

In the analysis of price effect, individuals who purchased health insurance coverage as part of life insurance policies were excluded from the analysis. This was done to ensure that the price data which was imputed using gender and age, based on a standard hospital and surgical policy, was comparable to the price (premium) paid by the respondents for their health insurance. The results reveal that price was negatively associated with health insurance purchase for salaried individuals, but was not significant in the non salaried individuals' regression model. Nonetheless, the effect of price on the demand for health insurance is small as the price elasticity found was less than 1.

Then, using the improved (reduced form) model, an attempt was made to predict the likelihood of a person buying health insurance given the person's characteristics on a split independent sample. In both the salaried and non salaried individuals' models, the prediction based on the model was significantly better than the prediction would have been based on the assumption of independence. In other words, the models appeared to reduce prediction errors, and thus were useful for predicting potential health insurance buyers and non-buyers.

The final analysis attempted to explore the factors that affect the amount of insurance coverage bought given the decision to purchase health insurance. The OLS estimator was used as the inverse Mill's ratio in the Heckman two-stage estimation was found to be insignificant. For the salaried individuals, the result shows that income, gender, race-religion (non Muslim), marital status (divorcee) and job sector were significant in influencing the level of insurance coverage purchased. For the non salaried individuals, only variables race-religion (non Muslim) and education level (primary education) were significant.

The findings in the chapter add substantive information to the current knowledge in the field of health insurance demand especially in the Malaysian health care environment and insurance industry. Further discussion on the policy implications and recommendations are presented in the next chapter.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the study is summarized and concluded. Then, recommendations for the stakeholders and future researches are put forward.

The study contributes to the whole academic research in the field of insurance decision making as it comprehensively analyses the factors that affect the decision to purchase health insurance as well as the factors that affect the amount of health insurance coverage given the decision to purchase.

5.2 Conclusions

This study provides preliminary evidence on the factors that affect the demand for individually purchased health insurance in the Malaysian market. As each country's health care system is unique, empirical evidence in a specific country is necessary for the country to directly derive benefits from the findings. Specifically, the study was designed to compare the profiles of the insured and the uninsured, to determine the factors that affect the likelihood of purchasing health insurance, including the price effect and the factors that affect the level of coverage given the decision to purchase. As the sample size is significantly large, the study was also set out to predict the likelihood of purchase given the characteristics of the individuals.

The theoretical framework of this study was mainly based on the EU theory, the Prospect theory and the Bounded Rationality theory. Fundamentally, the study sets out to examine whether the propositions of these theories could explain the pattern of individual health insurance demand in the context of Malaysia. The hypotheses developed were also supported by findings from the previous literatures.

In order to achieve the research objectives, the study employed the logistic regression analysis and the OLS estimator. The decision whether to purchase health insurance or otherwise was analyzed using the logistic regression as the dependent variable was dichotomous. The dependent variable in the logistic regression was the ownership of health insurance (purchase or not purchase health insurance) and in the OLS regression was the amount of premium paid. To overcome the problem of multicollinearity, the sample was split into salaried and non salaried individuals.

In terms of the profiles, the insured, compared to the uninsured, were more likely to belong to a smaller household, earn higher income, be younger, be married, be more educated, be male, and be non Muslims. The insured tended to live in the urban area, and closer to the private hospitals. In addition, those who owned health insurance were more likely to work in the service sector, and be employed as civil servants or employed in the private sector (rather than being self-employed, housewives or unemployed).

In addition, the insured were more likely to be risk averse. It is rather interesting to record that the insured and the uninsured were not different in terms of their health status, out-of-pocket expenditures and number of inpatient and outpatient visits. Nevertheless, the results show that the profiles of the insured were significantly different from the uninsured in most of the dimensions measured.

Table 5.1 provides stylised comparison between the insured and the uninsured. It is based on the univariate test and contrasts the profiles of the insured and uninsured among the listed dimensions. The result should not be taken as absolute. For example, the gender variable simply means that the proportion of insured male is greater than female. The main intention is just to compare and the effect of each variables on the decision to purchase health insurance is covered in the following discussion.

Table 5.1
The Profiles of Insured vs Uninsured

Variables	Insured	Uninsured
X_1 = income	Higher	Lower
X_2 = age	Younger	Older
X_3 = gender	Male	Female
X_4= religion	Non Muslim	Muslim
X_5 = education level	Higher	Lower
X_6 = marital status	Married	Single, divorced, or widowed
X_7= household size	Smaller	Bigger
X_8 = type of occupation	Service sector	Non service sectors
X_9= job sector	Public or, private sector employee	Self-employed, housewife, unemployed
X_{10}= urban vs rural	Urban	Rural
X_{11}= distance to the private hospital	Nearer	Farther
X_{12}= frequency of visit to inpatient and outpatient	No difference	
X_{13}= out-of-pocket cost	No difference	
X_{14} = health status	No difference	
X_{15}= attitude towards risk	Risk Averse	Risk Taker

The factors that affect the decision to purchase health insurance had to be analysed with a slight change due to the presence of multicollinearity, between income and job sector, in particular, among non-salaried individuals, and therefore, the salaried and non salaried individuals had to be analyzed separately.

For the salaried individuals, the significant factors were income level, age, gender, race-religion, education level, job sector and risk attitude. Specifically, one was more likely to purchase health insurance if one was older, and earned higher income. Further, one was more likely to purchase if one was a female (rather than a male), a non-Muslim (rather than a Muslim), a civil servant (rather than a private employee, or self-employed). Furthermore, one was more likely to purchase if one had at least secondary level education. The result also revealed that the effect of age was nonlinear in that older individuals were more likely to purchase health insurance but only up to the age of 35.5 years old.

For the non salaried individuals, the factors that affected the decision to purchase health insurance were race-religion, education level, marital status and out-of-pocket (OOP) health expenditures. Specifically, one was more likely to purchase if one was a non-Muslim (rather a Muslim), more educated and married (rather than single, divorced or widowed). Moreover, one was more likely to purchase if one's out-of-pocket health expenditure increased.

The effect of price on the likelihood of purchase was found to be significant for the salaried but not for the non salaried individuals. Specifically, the lower the price the more likely a salaried individual will purchase health insurance. However, the demand for health insurance was relatively price inelastic, meaning that individuals in Malaysia were less responsive to price change. In other words, a rather huge price reduction may need to be effected in order to induce a substantive increase in purchase.

Further analysis reveals that the prediction of potential health insurance buyers based on the model was significantly better than the prediction would have been otherwise (based on the assumption of independence)[11]. Although the performance criteria for the non salaried individuals' model were rather weak, both models are useful for predicting potential insurance buyers. In other words, given the individual characteristics, we can predict an individual's likelihood of purchasing health insurance better than guessing based on the sample mean.

The decision on the amount of coverage is no less important than the decision to purchase. For the salaried individuals, factors affecting the level of coverage are income, gender, race-religion and job sector. Specifically, an individual who earned higher income, a female, a non-Muslim and worked in the private sector or unemployed was associated with a higher amount of health insurance coverage. On contrary, for the non-salaried

[11] This is akin to simply guessing based on the sample mean.

individuals, being a non-Muslim was associated with higher level of health insurance coverage while being less educated was associated with a lower health insurance coverage.

The detailed results for the salaried individuals are presented in Table 5.2.

Table 5.2
Summary of Results for Salaried Individuals

Variables	**Effect on Probability of Purchase**	**Effect on Amount of Coverage**
X_1 = income	+	+
X_2 = age	Not linear	Not significant
X_3 = gender	Female +	Female +
X_4= race	Non Muslim +	Non Muslim +
X_5 = highest education level	+	Not significant
X_6 = marital status	Not significant	Divorcee -
X_7= household size	Not significant	Not significant
X_8 = type of occupation	Not significant	Not significant
X_9= job sector (private vs public)	Public +	Private Sector + ; Self-employed +
X_{10}= location of residence (urban vs rural)	Not significant	Not significant
X_{11}= distance to the private hospital	Not significant	Not significant
X_{12}= number of in/outpatient visits	Not significant	Not significant
X_{13}= out-of-pocket cost	Not significant	Not significant
X_{14} = health status	Not significant	Not significant
X_{15}= attitude towards risk	Risk Averse +	Not significant
X_{16} = price of hospital and surgical policy	-	NA

It is also worth noting the findings which were inconsistent with the hypotheses developed in this study. The relevant variables are marital status, household size, types of occupation, job sector, urban vs. rural, distance to private hospitals, number if inpatient and outpatient visits and out-of-pocket cost. Detailed discussion was presented in Chapter 4, but brief pointers are

presented next covering the absence of influence by job sector and household size only.

It was hypothesized that those working in the public sector would be less likely to purchase health insurance since they can get almost free health care treatment at the government hospitals. In addition, previous studies also confirmed this hypothesis (Besley et al, 1999). In this study, however, it was found that the civil servants were more likely to be insured. In Chapter 4, the result was justified by proposing that civil servants may be more risk averse, and thus, may have obtained health insurance to ensure prompt accessibility to health care when necessary. However, this finding may also indicate other factors such as the perceived lower health care quality at the public health care institutions. Undoubtedly, further investigation needs to be carried out.

Another variable is the household size. The finding shows that the likelihood of purchase was not affected by the household size although it was hypothesized that household size was negatively associated with health insurance purchase. As argued in Chapter 4, the household size may have two opposing effects that off-set one another. Nonetheless, the fact that households in Malaysia are very likely to include extended family members or even members from another family, calls for a more refined measure of household size as any insurance only covers immediate family members.

This study adds to our knowledge on individuals' health insurance decision. As currently the Malaysian government is looking into a new health financing system, the findings from this study may add to the needed critical information to support the government's plan. Although this study only focuses on the private health insurance, its contribution to the overall financing system is substantive as health insurance will certainly be one of the financing mechanisms to be utilized. Whether social or private health insurance programs, both may require contribution from the individuals, and thus, understanding how the various factors affect the decision to purchase health insurance can be useful in implementing the programs.

5.3 Recommendations

The findings from this study benefit the policy makers and the insurance industry players, as well as providing valuable insight for future research.

5.3.1 Benefits to Policy Makers and Insurance Industry Players

The success in introducing a new health care financing scheme, be it a national health insurance program or a new health insurance product, often depends on understanding how individuals will respond. More accurate prior knowledge of purchasing patterns would allow managers or the policy makers to better forecast administrative costs, better educate the population, or even help determine if offering a new program would be of any value.

The findings highlight that the salaried and the non-salaried individuals were influenced by different factors in their decision to purchase

health insurance. As such, any intervention program ought to be tailor made to these groups. Nonetheless, there are some common factors that influence the decision making such as the educational attainment. An awareness program is especially needed for the lower educated individuals in both groups. The complexities of the insurance mechanism need to be explained so that the benefits of the insurance protection are well understood and the needs for protection can be fairly matched with the type of health insurance policy. Any social insurance program may need to be designed as to ensure that the health plans are simple and easy to understand. Other factor such as income level affects the likelihood of purchasing health insurance and on the amount of coverage among the salaried individuals only. As such, any intervention program focusing on increasing the level of income among salaried individuals may be likely to increase the level of health insurance ownership.

The effect of price on the demand for health insurance sheds further insight. Although the analysis reveals that the lower the price of the health insurance the more likely an individual will purchase health insurance, the price elasticity was very low meaning that a high price-cut or subsidy may be needed to induce purchase. Should the policy makers decide to promote the growth of private insurance in an effort to reduce crowd-out at the public health care institutions, any intervention program on the price or the premium needs to be carefully designed. As one of the most important features of any health insurance product is the price, the actual contribution paid by the individuals (in this case the salaried individuals) towards the

health insurance coverage need to be attractive. The intervention program can be in the form of price subsidy or increase in tax exemption for premium contributed towards health insurance. However, since the price elasticity is low, increasing tax exemption may not sufficiently increase the number of individual buyers, but it would further benefit the current buyers and adversely lead to lower tax collection for the government. In short, using price subsidy to induce purchase may be ineffective intervention.

The proposed national health insurance (NHI) program may require mandatory participation from the public or it can be made voluntary such as the case in Vietnam. The findings from this research predict that individuals who are more likely to participate are high income earners, older individuals, female, non Muslim, civil servants and more educated individuals. If participation is voluntary, the pool is very likely to comprise of individuals of these categories. A quick assessment may indicate that the NHI on a voluntary basis may not reach the targeted group which are the low income earners. Further, having more old individuals in the pool is risky to the long term sustainability of the fund since they are higher risks. Thus, the policy makers need to implement the NHI based on mandatory contribution to ensure that these vulnerable are protected. If not, the social insurance pool needs to compete with the private insurance pool that offers a less expensive coverage for the low risk individuals such as the younger individuals.

The NHI program will be more likely in the form of a social insurance program which requires mandatory contributions from members of the pools regardless whether it is made by the employer or the individuals. Premium collection or public contributions towards the social insurance program based on a pure community rating program will guarantee equal coverage regardless of health status, age, gender, types of occupation or other underwriting criteria. In this setting, the younger will subsidize the older and the healthy will subsidize the sickly. Thus a social insurance program usually provides basic coverage as the intention is to ensure everyone is covered. This study reveals that individuals who earned higher income, are non-Muslims and work as private sector employees or self-employed were associated with higher level of health insurance coverage. In other words, these individuals were inclined to purchase health insurance with extensive benefits. Since a social insurance program only provides basic coverage, there will be a demand for private health insurance to complement or to top up the basic benefits offered by a social insurance program. Therefore, allowing the private and public partnership may benefit the consumers at the same time ensuring the current uninsured individuals receive the needed protection.

Further investigation may be needed to explain the effect of job sector on the decision to purchase and on the level of coverage sought. The findings show that the private sector employees and the self-employed were less likely to purchase health insurance compared to the civil servants but were associated with a higher level of coverage. As discussed in Chapter 4,

this may be due to the fact that the private sector employees are covered by programs offered by their employers which explain the low likelihood of purchase and they may have higher income which then explains the extensive health insurance coverage. An issue of interest to the industry players is the possibility that the health insurance product offered is less attractive to the private sector employees or may not meet the needs of the unemployed. Therefore, product innovation is needed to attract these groups. Likewise, the low likelihood of purchase among the self-employed raises operational issues for the policy makers. The fact that the self-employed are high risk individuals may not only hinder their participation in the program, but also make it difficult to collect premium from this group as there is no formal salary collection, should the mandatory social insurance program be implemented.

What may be of further interest to managers is the finding that individuals with certain characteristics were more likely to purchase health insurance. The reduced form model predicts an individual's inclination to purchase health insurance based on income level, age, gender, religion, education attainment, job category and safety behaviour. For industry players, the knowledge about these characteristics may help them reach the potential clients at almost 76% accuracy level. In other words, marketing strategies can be targeted to the individuals who have those characteristics. Focused marketing strategies will reduce waste and ensure better sales.

5.3.2 Future Research

One of the more significant findings to emerge from this study is the measure of risk attitude via the safety behaviour of individuals. Propper (1989) found that risk attitude measured by smoking behaviour and self-employment status was not significant despite the fact that the EU theory predicts that risk averse individuals are high potential buyers. In this study, the risk attitude as measured by individual safety behaviours was found to be significant in the decision to purchase health insurance. The effect was also consistent with the EU theory, in which the high risk-taking individuals were less likely to purchase health insurance.

Another notable finding was that there were only two useful predictors for the level of health insurance coverage for non-salaried individuals. In other words, the set of variables used in this study may not be useful enough in explaining the decision on the level of health insurance coverage bought by non-salaried individuals. This may indicate that the non-salaried individuals may need to be analyzed from a family perspective. The purchasing decision of non salaried individuals may be influenced more by the characteristics of the head of household or the individual who earns income in the household or family. An additional question on who made the purchasing decision, regardless of who pays the premium, may need to be asked to ascertain the individuals who influence the decision making.

Besides, future research is needed to address several unavoidable limitations of the present study. One of the problems encounters in this

study is to determine the actual health insurance ownership as there is no information on the type of coverage (individual, individual and spouse, individual and family). As explained in the Research Methods chapter, the unit of analysis was the individual, and thus, it was assumed that the respondents in this study were separate individuals. Given this assumption, there are two issues that arise here:

1. Duplication of responses. The individual ownership data may have captured purchases of the same health insurance product from both the husband and the wife living in the same household. The problem escalates for the premium variable as the individual and the spouse may have actually paid a single family premium.

2. Differences in the reference to the terms of coverage of the policy – individual or family. If the respondent purchased a family cover, it is very likely that the total premium for the family cover would have been given.

For the price imputation, it was assumed that the individual was offered a standard health and surgical policy for individual coverage. As the assumption made in this study was that each individual purchased individual coverage, the premium data may have been overstated.

This study was carried out with great caution. The independent variables used in the analyses reflect individual information. For example,

individual income was used and not the household income. Although the problem may have been overcome by using only single adults, in other words, excluding married individuals, it would leave the data set with only 3,621 respondents, and more importantly, the influence of some predictors, such as marital status, could have not been examined. As this study is the first attempt to explore the demand for health insurance in Malaysia, and also to predict the likelihood of purchase, it is preferable to have as large a data set as possible. In addition, previous studies have used marital status as one of the predictors (Buchmeuller & Ohri, 2006; Gruber & Poterba, 1994; Liu & Chen, 2002). Thus, no attempt was made to exclude married individuals.

The above shortcomings are to be expected when the available data are from secondary surveys, designed for the purpose other than that required by the researcher. In spite of this, the data from NHMS III has made the study on the demand for health insurance possible for the Malaysian case as it is a nationally representative data set. The low percentage of the population who purchased health insurance implies the collection of a large scale data set at a very high cost. Therefore, it may not be feasible to carry out an independent primary survey for this study. An independent primary survey might not capture enough sample of those who own health insurance, and this may lead to weak estimations or models.

The findings of this study can be further improved given higher accuracy of data. As such, it is recommended that in future surveys, information on the types of health insurance coverage must be included. This would not only increase the accuracy of the data for ownership and premium variables, but also help in determining the data for the price variable with a greater degree of accuracy. The following questions may be included in the survey:

1. Do you have any type of health insurance coverage?
2. Please indicate the type of health insurance policy bought
    a. Medical Expense Insurance
    b. A Rider to Life Insurance Policy
3. Please specify further the type of health insurance bought into one of the following categories[12]
    a. Hospital & Surgical Policy
    b. Hospital Income Policy
    c. Critical Illness Policy
    d. Personal Accident Policy
    e. Other, pls indicate
4. Please indicate the type of coverage bought
    a. Individual only
    b. Individual and spouse
    c. Individual and children
    d. Individual and family

[12] Detailed explanation on each type of policy needs to be provided to guide the respondents in their selection

5. How much annual premium is paid for the above health insurance coverage?
6. Who is responsible for the payment of premium for the above health insurance coverage?
    a. Myself
    b. My spouse
    c. Other, pls indicate

7. Who is responsible in making the decision to purchase the health insurance coverage?
    a. Myself
    b. My spouse
    c. Other, pls indicate

The above question is vital as in the HNMS III, the detailed answers provided in the "other" section of the type of health insurance policy purchased show a lack of understanding by the respondents on the type of health insurance owned. It indicates that respondents may have reported all health insurance policies owned regardless of whether they were purchased individually or by a third party, such as the employer. Although a study by Besley *et al.* (1999) showed that the findings were similar when the individual purchase was separated from ESI purchase, and when both were pooled, the findings may be different in the Malaysian context. Nonetheless, as the prevalence of group health insurance in Malaysia is low, the influence of employer decision may not be significant for the period of this study.

Other information that may be of interest to the researchers are the total health care expenditure besides the out-of-pocket and the details on the sources of fund for paying the health care expenditure. The individuals may be more influenced by the total health care expenditure as it reflects the financial catastrophe that the individual may have to face given there is no financial assistance from other sources. Whereas the sources of fund may reveal the prevalence of social support mechanisms such as donation from the community. The source of funds may also disclose whether or not an individual is covered by the employer health insurance program (ESI). The question may be phrased as follows:

1. How much cost have you incurred for hospitalization / outpatient clinic?
2. Who pays for the health care cost / expenditures?
    a. out-of-pocket / myself. Pls indicate the amount RM_____
    b. Employer. Pls indicate the amount RM_____
    c. Insurance Company. Pls indicate the amount RM_____
    d. Others, pls indicate

Furthermore, the analysis is based on a cross-sectional data, and thus variables such as the out-of-pocket health expenditures and number of visits are based on concurrent (contemporaneous) data. A more accurate formulation would be that past utilization behaviour is set to predict future purchase. As such, time-series data may be preferable. Since this is a cross-sectional data, the NHMS contains no data on past OOP cost and past

utilization behaviour. As these variables are important determinants in health insurance purchase decision, in this study, the reported OOP cost and utilization rate had to be used to proxy past OOP cost and utilization behavior. Moreover, time series data on health insurance ownership could be used to predict potential buyers as well as to compare with actual purchasing decision in the subsequent years.

The health care decision outcomes can be financial and nonfinancial. Thus, it would be interesting to assess the effect of subjective elements such as personal belief, access to certain doctors, confidence in a particular insurance provider, etc. These elements can be assessed using the Likert scale and factor analysis can be utilized to derive the non financial factors that affect the health insurance demand. The factors suggested in the Theory of Planned Behaviour may be further explored. One intriguing question that arises from this study is why Muslims were less likely to purchase health insurance coverage. Further investigation on subjective elements may reveal the answers.

It is also recommended that further research be undertaken to investigate the effect of health insurance ownership on health care utilization. In this study, health care utilization as proxied by the number of visits to the inpatient and outpatient clinics did not affect the likelihood of purchasing health insurance as well as the amount of coverage. The result may be due to the fact that the data is cross sectional whereby the current

year utilization and ownership were used to predict purchase. Previous studies provide some evidence on the relationship between health insurance ownership and health care utilization (Buchmueller, Grumbach, Kronick, & Kahn, 2005; Cameron *et al.*, 1988). Not much can be said about whether those who owned health insurance change their medical behaviour arising from the fact that they are covered by health insurance in the Malaysian context. As briefly discussed in section 2.2.1, the existence of moral hazard among the individuals will result in excessive utilization in health care and lead to welfare loss. As such, the effect of health insurance ownership on health care utilization would be of interest to policy makers and insurance providers as the moral hazard problem may jeopardize the sustainability the health insurance program.

Further research might also investigate the effect of health insurance ownership using the family as a unit of analysis. This will avoid the problem of separating the salaried and non salaried individuals. Of course, the data collection needs to be arranged in such a way that the family size information is available as in Malaysia it is not uncommon to find more than one family living in one household.

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APPENDIX A

Table A1
Group statistics and Independent sample test for income

Health Insurance Ownership	N	Mean	Std. Deviation	Std. Error Mean
Do not Own	11295	630.31	793.803	7.469
Own Health Ins	2928	1556.22	1404.809	25.962

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	514.98	0.00	-46.89	14221	0.00	-925.91	19.75	-964.62	-887.21
Equal variances not assumed			-34.27	3426	0.00	-925.91	27.02	-978.88	-872.94

Table A2
Group statistics and Independent sample test for age

Health Insurance Ownership	N	Mean	Std. Deviation	Std. Error Mean
Do not Own	11295	39.74	14.281	0.134
Own Health Ins	2928	37.51	10.494	0.194

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	401.81	0.00	7.93	14221	0.00	2.24	0.28	1.68	2.79
Equal variances not assumed			9.48	6050	0.00	2.24	0.24	1.77	2.70

Table A3.1
Crosstab Health Insurance Ownership and Gender

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Gender	Male	Count	5773	1935	7708
		% within Gender	74.9%	25.1%	100.0%
	Female	Count	5522	993	6515
		% within Gender	84.8%	15.2%	100.0%
Total		Count	11295	2928	14223
		% within Gender	79.4%	20.6%	100.0%

Table A3.2
Chi-Square test for Gender

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	210.050[a]	1	.000		
Continuity Correction[b]	209.448	1	.000		
Likelihood Ratio	213.913	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	210.036	1	.000		
N of Valid Cases[b]	14223				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 1341.20.

b. Computed only for a 2x2 table

Table A4.1

*Race * Health Insurance Ownership Cross tabulation*

			Health Insurance Ownership includes Part of Life only		
			Do not Own	Own Health Ins	Total
Race	Malays	Count	7843	1449	9292
		% within Race	84.4%	15.6%	100.0%
	Chinese	Count	1438	945	2383
		% within Race	60.3%	39.7%	100.0%
	Indian	Count	832	393	1225
		% within Race	67.9%	32.1%	100.0%
	Other bumis	Count	905	108	1013
		% within Race	89.3%	10.7%	100.0%
	Others	Count	277	33	310
		% within Race	89.4%	10.6%	100.0%
Total		Count	11295	2928	14223
		% within Race	79.4%	20.6%	100.0%

Table A4.2

*Religion * Health Insurance Ownership Cross tabulation*

			Health Insurance Ownership includes Part of Life only		
			Do not Own	Own Health Ins	Total
Religion	Islam	Count	8446	1522	9968
		% within Religion	84.7%	15.3%	100.0%
	Christian	Count	691	188	879
		% within Religion	78.6%	21.4%	100.0%
	Buddha	Count	1281	851	2132
		% within Religion	60.1%	39.9%	100.0%
	Hindu	Count	701	338	1039
		% within Religion	67.5%	32.5%	100.0%
	Others	Count	165	26	191
		% within Religion	86.4%	13.6%	100.0%
Total		Count	11284	2925	14209
		% within Religion	79.4%	20.6%	100.0%

Table A4.3

Chi-Square Tests for Race and Religion

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	581.528[a]	2	.000
Likelihood Ratio	551.959	2	.000
Linear-by-Linear Association	512.468	1	.000
N of Valid Cases	14223		

Table A5.1

Crosstab Health Insurance Ownership and Education

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Education	Tertiary	Count	589	583	1172
		% within Education	50.3%	49.7%	100.0%
	Secondary	Count	6379	1859	8238
		% within Education	77.4%	22.6%	100.0%
	Primary	Count	3525	446	3971
		% within Education	88.8%	11.2%	100.0%
	None	Count	802	40	842
		% within Education	95.2%	4.8%	100.0%
Total		Count	11295	2928	14223
		% within Education	79.4%	20.6%	100.0%

Table A5.2

Chi-Square test for Education

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	970.958[a]	3	.000
Likelihood Ratio	928.015	3	.000
Linear-by-Linear Association	827.392	1	.000
N of Valid Cases	14223		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 173.34.

Table A6.1

Crosstab Health Insurance Ownership and Marital Status

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Marital Status	Not married	Count	2396	603	2999
		% within Marital Status	79.9%	20.1%	100.0%
	Married	Count	8332	2270	10602
		% within Marital Status	78.6%	21.4%	100.0%
	Divorcee	Count	214	26	240
		% within Marital Status	89.2%	10.8%	100.0%
	Widow/Widower	Count	353	29	382
		% within Marital Status	92.4%	7.6%	100.0%
Total		Count	11295	2928	14223
		% within Marital Status	79.4%	20.6%	100.0%

Table A6.2

Chi-Square test for Marital Status

	Value	df	Asymp. Sig. (2-s
Pearson Chi-Square	58.254[a]	3	.000
Likelihood Ratio	70.119	3	.000
Linear-by-Linear Association	15.988	1	.000
N of Valid Cases	14223		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 49.41.

Table A7
Group statistics and Independent sample test for household size

Health Insurance Ownership	N	Mean	Std. Deviation	Std. Error Mean
Do not Own	11295	4.79	2.436	0.023
Own Health Ins	2928	4.54	2.298	0.042

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	13.942	0.000	4.971	14221	0.000	0.248	0.05	0.15	0.346
Equal variances not assumed			5.144	4775	0.000	0.248	0.048	0.154	0.343

Table A8.1

*Occupation * Health Insurance Ownership Cross tabulation*

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Occupation	Senior Offical & Manager	Count	108	104	212
		% within Occupation	50.9%	49.1%	100.0%
	Profesionals	Count	467	426	893
		% within Occupation	52.3%	47.7%	100.0%
	Technical & Associate	Count	765	607	1372
		% within Occupation	55.8%	44.2%	100.0%
	Clerical Workers	Count	576	273	849
		% within Occupation	67.8%	32.2%	100.0%
	Service Workers & Shop	Count	1922	556	2478
		% within Occupation	77.6%	22.4%	100.0%
	Skilled Agricultural & Fishery	Count	1246	109	1355
		% within Occupation	92.0%	8.0%	100.0%
	Craft & Related Trade Workers	Count	959	179	1138
		% within Occupation	84.3%	15.7%	100.0%
	Plant & Machine Operator &Assembler	Count	795	273	1068
		% within Occupation	74.4%	25.6%	100.0%
	Elementary Occupations	Count	650	101	751
		% within Occupation	86.6%	13.4%	100.0%
	Housewife	Count	2784	231	3015
		% within Occupation	92.3%	7.7%	100.0%
	Unemployed	Count	1023	69	1092
		% within Occupation	93.7%	6.3%	100.0%
Total		Count	11295	2928	14223
		% within Occupation	79.4%	20.6%	100.0%

Table A8.2
Crosstab Health Insurance Ownership and Types of Occupation

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Types of Occupations	Service Sector	Count	3073	1359	4432
		% within Types of Occupations	69.3%	30.7%	100.0%
	NonService Sector	Count	8222	1569	9791
		% within Types of Occupations	84.0%	16.0%	100.0%
Total		Count	11295	2928	14223
		% within Types of Occupations	79.4%	20.6%	100.0%

Table A8.3
Chi-Square Tests for Types of Occupation

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	399.899[a]	1	.000		
Continuity Correction[b]	399.004	1	.000		
Likelihood Ratio	381.346	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	399.871	1	.000		
N of Valid Cases[b]	14223				

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 912.39.

b.Computed only for a 2x2 table

Table A9.1

Crosstab Health Insurance Ownership and Job Sector

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Job Sector	Civil Servant	Count	991	726	1717
		% within Job Sector	57.7%	42.3%	100.0%
	Private Sector Employee	Count	3870	1299	5169
		% within Job Sector	74.9%	25.1%	100.0%
	Self-Employed	Count	2627	603	3230
		% within Job Sector	81.3%	18.7%	100.0%
	Others	Count	3807	300	4107
		% within Job Sector	92.7%	7.3%	100.0%
Total		Count	11295	2928	14223
		% within Job Sector	79.4%	20.6%	100.0%

Table A9.2

Chi-Square Tests for Job Sector

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1010.121[a]	3	.000
Likelihood Ratio	1037.968	3	.000
Linear-by-Linear Association	966.703	1	.000
N of Valid Cases	14223		

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 353.47.

Table A10.1

Crosstab Health Insurance Ownership and Location of Residence

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Residence	Urban	Count	5685	2057	7742
		% within Residence	73.4%	26.6%	100.0%
	Rural	Count	5610	871	6481
		% within Residence	86.6%	13.4%	100.0%
Total		Count	11295	2928	14223
		% within Residence	79.4%	20.6%	100.0%

Table A10.2

Chi-Square Tests for Location of Residence

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	372.018[a]	1	.000		
Continuity Correction[b]	371.215	1	.000		
Likelihood Ratio	383.030	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	371.992	1	.000		
N of Valid Cases[b]	14223				

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 1334.20.

b.Computed only for a 2x2 table

Table A11

Group statistics and Independent sample test for distance to private hospitals

Health Insurance Ownership	N	Mean	Std. Deviation	Std. Error Mean
Do not Own	11295	49.97	81.013	0.762
Own Health Ins	2928	34.72	60.04	1.11

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	109.94	0.00	9.53	14221	0.00	15.25	1.60	12.11	18.39
Equal variances not assumed			11.33	5996	0.00	15.25	1.35	12.61	17.89

Table A12
Mann-Whitney U Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Monthly Income w zero income is the same across categories of Health Insurance Ownership includes Part of Life only.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
2	The distribution of Distance to Private Hosp is the same across categories of Health Insurance Ownership includes Part of Life only.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
3	The distribution of Number of In-Patient & Out-Patient Visit is the same across categories of Health Insurance Ownership includes Part of Life only.	Independent-Samples Mann-Whitney U Test	.321	Retain the null hypothesis.
4	The distribution of Total OOP Expenditure is the same across categories of Health Insurance Ownership includes Part of Life only.	Independent-Samples Mann-Whitney U Test	.286	Retain the null hypothesis.
5	The distribution of Safety Behavior is the same across categories of Health Insurance Ownership includes Part of Life only.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A13.1

Crosstab Health Insurance Ownership and Health Status

			Health Insurance Ownership		
			Do not Own	Own Health Ins	**Total**
Health Status	No Chronic Disease	Count	8679	2370	11049
		Expected Count	8774.4	2274.6	11049.0
		% within Health Status	78.6%	21.4%	100.0%
	With chronic diseases	Count	2616	558	3174
		Expected Count	2520.6	653.4	3174.0
		% within Health Status	82.4%	17.6%	100.0%
Total		Count	11295	2928	14223
		% within Health Status	79.4%	20.6%	100.0%

Table A13.2

Chi-Square Tests for Health Status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.622[a]	1	.203		
Continuity Correction[b]	1.564	1	.211		
Likelihood Ratio	1.630	1	.202		
Fisher's Exact Test				.208	.106
Linear-by-Linear Association	1.622	1	.203		
N of Valid Cases[b]	14223				

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 842.81.

b.Computed only for a 2x2 table

Table A14.1

Crosstab Health Insurance Ownership and Risk Attitude1

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Smoking Behavior	No	Count	8016	**2113**	10129
		Expected Count	8043.8	2085.2	10129.0
		% within Smoking Behavior	79.1%	20.9%	100.0%
	Yes	Count	**3279**	815	4094
		Expected Count	3251.2	842.8	4094.0
		% within Smoking Behavior	80.1%	19.9%	100.0%
Total		Count	11295	2928	14223
		% within Smoking Behavior	79.4%	20.6%	100.0%

Table A14.2

Chi-Square Tests for Risk Attitude1

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.622[a]	1	.203		
Continuity Correction[b]	1.564	1	.211		
Likelihood Ratio	1.630	1	.202		
Fisher's Exact Test				.208	.106
Linear-by-Linear Association	1.622	1	.203		
N of Valid Cases[b]	14223				

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 842.81.

b.Computed only for a 2x2 table

Table A15.1

Cross Tabulation Health Insurance Ownership and Risk Attitude2

			Health Insurance Ownership		
			Do not Own	Own Health Ins	Total
Safety Behavior	Risk averse	Count	6244	1952	8196
		% within Safety Behavior	76.2%	23.8%	100.0%
	Moderate Risk Averse	Count	2744	658	3402
		% within Safety Behavior	80.7%	19.3%	100.0%
	Moderate risk taker	Count	1925	289	2214
		% within Safety Behavior	86.9%	13.1%	100.0%
	Risk taker	Count	382	29	411
		% within Safety Behavior	92.9%	7.1%	100.0%
Total		Count	11295	2928	14223
		% within Safety Behavior	79.4%	20.6%	100.0%

Table A15.2

Independent Samples Test for Risk Attitude2

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	317.355	.000	13.385	14221	.000	.233	.017	.199	.268
Equal variances not assumed			15.079	5441.661	.000	.233	.015	.203	.264

APPENDIX B

Table B1
VIF for Model 3

Variable	VIF	1/VIF
Primary	3.83	0.261258
Secondary	3.06	0.327001
Self-employed	2.38	0.419839
Private sector employees	2.28	0.437863
Age	2.17	0.459777
Married	1.72	0.580587
None	1.7	0.587915
Income	1.62	0.615948
Number of visit	1.62	0.616471
OOP cost	1.54	0.648235
Rural	1.5	0.666738
Distance to Private Hospital	1.43	0.69907
Female	1.24	0.809111
Divorcee	1.22	0.82041
Others	1.16	0.865328
Bad Health Status	1.15	0.868812
Nonservice sector	1.14	0.876928
Widow/widower	1.11	0.902139
Safety Behavior	1.06	0.943951
NonMalay Muslim	1.06	0.945503
Household size	1.05	0.948587
Mean VIF	1.67	

Table B2
Logistic regression for salaried individuals and price excluding purchasers of health insurance policy as a rider

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Income	1.112	.084	175.080	1	**.000**	3.040
Female	.386	.107	13.116	1	**.000**	1.471
Non Malay Muslim	-.370	.278	1.770	1	.183	.691
Non Muslim	1.073	.099	117.293	1	**.000**	2.925
Secondary Education	-.159	.128	1.549	1	.213	.853
Primary Education	-.618	.188	10.767	1	**.001**	.539
No Education	-.685	.411	2.782	1	.095	.504
Married	.053	.119	.199	1	.656	1.055
Divorcee	-.660	.544	1.473	1	.225	.517
Widow/widower	-.063	.437	.021	1	.885	.939
Household Size	-.010	.020	.238	1	.626	.991
Non Service Sector	-.026	.093	.077	1	.781	.974
Private Sector Employee	-.623	.119	27.463	1	**.000**	.536
Self-employed	-.435	.138	9.895	1	**.002**	.648
Rural	-.162	.114	1.994	1	.158	.851
Distance to Private Hospital	.021	.040	.276	1	.599	1.021
Number of In/Outpatient Visits	.198	.150	1.734	1	.188	1.218
OOP cost	.011	.045	.061	1	.804	1.011
Bad Health Status	.041	.119	.120	1	.729	1.042
Safety Behaviour	-.139	.063	4.826	1	**.028**	.870
Price of Insurance	-.252	.122	4.264	1	**.039**	.777
Constant	-7.681	.971	62.521	1	.000	.000

Table B3

Logistic regression for Non Salaried individuals and price

Variables	B	S.E.	Sig.	Exp(B)
Male	-.143	.638	.823	.867
Non Malay Muslim	-16.989	3992.295	.997	.000
Non Muslim	1.709	.297	.000	5.526
Secondary Education	-1.294	.660	.050	.274
Primary Education	-1.611	.701	.022	.200
No Education	-1.647	.839	.050	.193
Married	1.304	.730	.074	3.683
Divorcee	.724	1.249	.562	2.062
Widow/widower	-15.902	3598.832	.996	.000
Household Size	.066	.047	.160	1.068
Unemployed	-.011	.579	.985	.989
Rural	-.770	.346	.026	.463
Distance to Private Hospital	-.137	.121	.256	.872
Number of In/Outpatient Visits	-.359	.426	.399	.698
OOP cost	.229	.113	.043	1.257
Bad Health Status	.039	.329	.905	1.040
Safety Behaviour	-.099	.162	.540	.906
Price of Insurance	-.207	.283	.464	.813
Constant	-2.122	1.848	.251	.120

Table B4
Reduced-form Logistic Regression for Non Salaried Individuals

Model Summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
816.362	.060	.164

Hosmer and Lemeshow Test

Chi-square	df	Sig.
8.550	8	.382

Classification Table

	Observed		Predicted		
			Health Insurance Ownership		
			Do not Own	Own Health Ins	Percentage Correct
Step 1	Health Insurance Ownership	Do not Own	1767	180	90.8
		Own Health Ins	79	46	36.8
	Overall Percentage				87.5

Cut off value 0.14

Table B5
Heckman Selection Model for Non Salaried Individuals

	Decision to Own						**Amount of Coverage**					
Variables	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Age	0.0254	0.0830	0.31	0.760	-0.137	0.188	-0.0025	0.0052	-0.48	0.630	-0.013	0.008
Female	0.5434	2.4225	0.22	0.823	-4.205	5.292	0.0536	0.2107	0.25	0.799	-0.359	0.467
NonMalay Muslim	-3.1499	12.4504	-0.25	0.800	-27.552	21.253	-0.4772	0.4113	-1.16	0.246	-1.283	0.329
Non Muslim	6.5284	19.7800	0.33	0.741	-32.240	45.297	**0.8139**	0.1029	7.91	0.000	0.612	1.016
Secondary Education	-5.3648	14.3349	-0.37	0.708	-33.461	22.731	**-0.5905**	0.2502	-2.36	0.018	-1.081	-0.100
Primary Education	-7.7138	20.8835	-0.37	0.712	-48.645	33.217	**-0.8647**	0.2700	-3.2	0.001	-1.394	-0.336
No Education	-9.2573	23.9331	-0.39	0.699	-56.165	37.651	**-0.9907**	0.3205	-3.09	0.002	-1.619	-0.363
Married	4.1961	12.1556	0.35	0.730	-19.628	28.021	**0.4875**	0.2390	2.04	0.041	0.019	0.956
Divorcee	2.4081	5.2379	0.46	0.646	-7.858	12.674	0.0319	0.4889	0.07	0.948	-0.926	0.990
Widow/widower	2.9599	7.8634	0.38	0.707	-12.452	18.372	0.2723	0.3822	0.71	0.476	-0.477	1.021
Household size	0.0899	0.2068	0.43	0.664	-0.315	0.495	0.0032	0.0196	0.16	0.871	-0.035	0.042
Unemployed	0.3509	3.1040	0.11	0.910	-5.733	6.435	0.1001	0.2025	0.49	0.621	-0.297	0.497
Rural	-2.3745	6.0182	-0.39	0.693	-14.170	9.421	**-0.2387**	0.1183	-2.02	0.044	-0.471	-0.007
Distance to Private Hospital	-0.3163	1.2026	-0.26	0.793	-2.673	2.041	-0.0470	0.0439	-1.07	0.284	-0.133	0.039
Number of In/Outpatient Visits	-0.6421	4.6912	-0.14	0.891	-9.837	8.552	-0.1766	0.1617	-1.09	0.275	-0.493	0.140
OOP cost	0.3844	1.9224	0.20	0.842	-3.383	4.152	0.0788	0.0480	1.64	0.101	-0.015	0.173
Bad Health Status	-0.7843	3.2483	-0.24	0.809	-7.151	5.582	-0.1315	0.1254	-1.05	0.294	-0.377	0.114
Safety Behavior	-0.8624	2.2412	-0.38	0.700	-5.255	3.530	-0.0900	0.0588	-1.53	0.126	-0.205	0.025
Constant	-9.6915	49.5533	-0.20	0.845	-106.814	87.431	**-1.1976**	0.4240	-2.82	0.005	-2.029	-0.367
mills lambda	8.4641	29.0042	0.29	0.770	-48.383	65.311						
rho	1.0000											
sigma	8.4641											
lambda	8.4641	29.0042										